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EDITORIAL NOTES.

Experts' Reports on the Manchester Lighting Trial.

As explained last week, the editorial article then published on the reports of the experts—Messrs. Jacques Abady and Mr. Haydn Harrison—who were consulted for the purpose of throwing light upon the path the Manchester City Council should tread when dealing with the future lighting of the main thoroughfares of the city was written before the text of the reports was in our possession. Since, there has been the opportunity of making a full examination of the details of the documents. As a result, we have nothing to withdraw from our view that the whole thing has resolved itself into practically a *fiasco;* and we are confirmed in our belief that, with the two reports before them, any attempt to base rational judgment upon their vitiated and contradictory features, will, without the utmost care is exercised, lead the Lighting Committee into a worse tangle than ever. They will find gas-lamps that are defective in their connections (not in themselves) pitted against flame arc lamps tuned up and kept up to the highest state of efficiency of which they, in their inherent defectiveness, are capable; they will find it distinctly acknowledged by both experts that the badly installed gas-lamps are doing equally as well in point of lighting power and distribution at the testing-levels as the flame arc lamps; they will find, in regard to the illumination tests, the two experts using different instruments, and making their tests at different levels (and both prepared to defend their choice); they will find Mr. Haydn Harrison, the electrical expert, with his photometers perched at a 3 ft. 3 in. level from the surface of the ground, obtain higher readings for the flame arc lamps than for the high-pressure gas-lamps, while Mr. Abady, taking his readings only 15 inches from the ground level, realizes the reverse; they will find Mr. Harrison loftily dismissing any necessity for the discussion of the respective attributes of the two sources of light that are combined under what we know as quality of light, while Mr. Abady gives the palm for quality of illumination (and we say correctly, from our own observations and knowledge of these things) to the high-pressure gas-lamps; they will find, too, in the matter of costs that Mr. Harrison does not regard it as part of his duty to investigate the fundamental costs of electricity and gas as furnished to him by the two departments, and forsooth he seems to be pleased to feel that this is not part of the reference to him, while Mr. Abady, on the other hand, is willing to discuss those fundamental costs if necessary, but leaves the matter with a statement of his inability to reconcile certain basic figures supplied to him by the Electrical Engineer. Placing the reports side by side, the guidance the Manchester City Council sought is not to be found in them by comparison; and the city councillors are placed in a more intricate position than ever.

The chief points agreed between the experts are that something was wrong with the installation and adjustment of the high-pressure gas-lamps; but that though there was the defect, and the lamps (which were practically converted into low-pressure ones by the defect) were giving only half their normal efficiency, their efficiency as illuminating agents was equal—we claim superior, from our own observations—to the flame arc lamps. This fact alone is an excellent acknowledgment in the eyes of the gas industry. There is little question that Mr. Harrison's report localizes the cause of the defect. The lamps were centrally suspended; and gas-tight flexible connections were not used. From the tubing, he says, there was "considerable leakage;" and the gas lost through this leakage was not taken into consideration when calculating the gas consumed in the lamps. This is all very well, so far as it goes; but we may take it Mr. Harrison knows that "considerable leakage" means a considerable loss of pressure in high-pressure work, and that a considerable loss of pressure results in a considerable diminution of lamp efficiency. These high-pressure lamps depend for their efficiency on the maintenance of the pressure to which they are adjusted and governed. A lapse is fatal to their highest duty. But of this fact, Mr. Harrison in his own report does not make any strong point. In this connection, we are not aware that Mr. Harrison has ever in his life had under his continuous management any high-pressure gas-lights; but, on the ability of these lamps to maintain their efficiency, a slur is cast by him, in the course of remarks that are diametrically opposed to the assertions of Mr. Abady, who has had extensive experience with high-pressure and low-pressure gas-lamps, and whose interests do not claim from him any marked partisanship.

It seems to us, indeed, that Mr. Harrison almost grudges making the admission that he has ever found any high-pressure gas-lamps that have given a better duty than these Princess Street lamps deprived by leakage (and perhaps condensation due to faulty suspension of the flexible connections) of the vital necessity of pressure. "I have," he says, "come "across examples where a better efficiency is obtained;" and the words appear to convey that Mr. Harrison was absolutely astonished over the casual examples. He proceeds: "But "the large number of high-pressure gas-lamps which I have "tested throughout the country have generally shown results "very similar to those existing in Princess Street." Now, perhaps Mr. Harrison will have the fairness to say whether these were the modern type of Keith lamp, and where they are to be found. Perhaps he will also say whether the deficiency in illuminating power was due to a "considerable "leakage" which deprived the lamps of their essential gas pressure. But, in view of his stated experience, how came Mr. Harrison to sign jointly with Mr. Abady the statement that, "as a comparison between the possibilities of arc light-"ing and high-pressure gas lighting, the results are vitiated "by the fact that the high-pressure gas-lamps are giving an "efficiency very much below similar lamps when properly "installed and adjusted?" If lamps of this type get their proper pressure, are clean and properly adjusted, and the mantles are in decent order, there is nothing whatever to prevent the highest possible efficiency being consistently obtained from them, and an efficiency which causes them in both illuminating duty and effect to out-distance flame arc lighting.

Now, what are the Manchester City Councillors to make out of the depreciatory remarks contained in Mr. Harrison's report when they bring them into comparison with the observations of Mr. Abady. In one place, the latter expert says that the Princess Street lamps are not installed nor adjusted in a manner to obtain normal efficiency, or anything approaching it. In another place, he says: "My "*invariable* personal experience is that high-pressure gas-"lamps, adjusted, and supplied with gas at suitable pres-"sure, have an efficiency of over 50 candles per cubic "foot, with a minimum of 40 candles." There are different types of high-pressure lamps; and they require different pressures. According to type and supply characteristics, the efficiency varies from 40 to 60 candles as normal efficiency. There the Manchester City Council are faced with contradictory experiences; and, as the matter stands, it almost comes to a question of personal credit between the experts. However, as a set-off to the derogatory statement of Mr. Harrison, the gas industry has the satisfaction of finding him signing the declaration that the degree of lighting in Princess Street by the pressure-underfed gas-lamps is approximately equal to that in Portland Street, with the arc lamps higher in candle power by about 1000!

We have spoken in previous articles dealing with this defective street-lighting experiment at Manchester of the necessity for studying the quality of the lighting of our streets, and of the duty of lighting authorities to give expression to correct views on this matter by adopting the form of lighting which supplies the public with the best quality of illumination. We have also pointed to the crass abuse in Portland Street of all the principles of scientific illuminating

engineering, with the view to beating by volume of light, though not by efficiency, the high-pressure gas-lamps, with the result that the degree of illumination is found to be approximately equal, though the high-pressure lamps were defective in their gas-supply pressure. It is clear that Mr. Harrison would not, as an electric illuminating engineer, like to be pressed too closely upon this point as to quality of lighting. He skates round the matter as gracefully as he can; but the degree of gracefulness in the eyes of those who read his report will have some relation to the knowledge they possess of the matters which he loftily dismisses. "I "have not," he writes, "dealt with details the merits of "which are purely psychological—such as general appear- "ance, colour of light, glare, &c.—as I am of opinion the "effect of these on different people depends largely on that "which they are accustomed to, and, therefore, it is not "possible to lay down any general rule which would satisfy "all." Probably not, when it is a little inconvenient with such an exhibition of bad lighting and glare as one finds in Portland Street. We suggest, with all confidence, that the lighting in Princess Street affords a respectable standard on these matters; and the men of practical affairs on the Manchester City Council will no doubt agree with us, after considering the matter from the physiological point of view as well as from Mr. Harrison's "psychological" standpoint. They will obtain some assistance in their consideration by reading Mr. Abady's report, in which he certifies that in the amount of general illumination, the quality of light, and freedom from involuntary extinctions, the Princess Street lighting is the superior of that in Portland Street. Later on, he shows that both the factors of diffusion and visual brightness ought to be taken into account in judging lights and lighting effects, in connection with which "gas lighting by "mantles has a distinct superiority over any form of arc "lighting yet devised." Thus it follows that "the test of "candle power is only one of several factors to be con- "sidered when comparing gas and electric arc lighting." That is a point of importance to be borne in mind by the city councillors.

Further to Illumination and Costs.

It is important, in considering additional points in connection with the experts' reports, that we should bear in mind the fact subscribed to by both Mr. Jacques Abady and Mr. Haydn Harrison that, though the Princess Street centrally suspended high-pressure gas-lamps were deprived of their proper pressure through the faulty connections put up locally, they were giving an illumination in the street approximately equal to the flame arc lamps; and in all respects the quality of the lighting was better physiologically and (if Mr. Haydn Harrison desires) psychologically considered. Mr. Harrison asserts that the most important factor in street illumination is the degree to which it is illuminated; and Mr. Abady claims that it is equally important that quality should be kept well to the fore. We quite agree with the latter expert; but we are also willing to take Mr. Harrison on his own ground. He says these gas-lamps which were being supplied with gas at a pressure much lower than was requisite gave a minimum horizontal illumination of 0·39 foot-candle, as compared with 0·5 foot-candle for the arc lamps, and a maximum of 1·9 foot-candles, as compared with 2·26 foot-candles. The difference in favour of the arc lamps was therefore only 0·36 foot-candle for the horizontal maximum illumination, and 0·11 foot-candle for the horizontal minimum illumination, although, at the 20° to 25° angles, the electric lamps were giving 1220 candles more, and at the 45° angle 1500 candles more than the gas-lamps. That is testimony worth thinking over. Mr. Abady's remarks, too, as to the effect of the superior quality of gas-light, are accentuated in considering the figures put forward by Mr. Harrison as resulting from tests with instruments of his own choosing, neither of which was the instrument used by Mr. Abady, the preference for which he justifies.

In this relation, another difference between the two experts which widens the incomparability of their work is that Mr. Harrison took all his readings 3 ft. 3 in. from the ground-level, while Mr. Abady went down to within 1 ft. 3 in. from the ground. Notwithstanding this greater distance from the source of the light, the latter expert obtained superior figures from the defectively equipped gas-lamps than from the electric flame arcs with their much higher initial candle power. His mean reading under the electric arc lamps was only 0·88 foot-candle; while under the gas-lamps it was 1·46 foot-candles. Between the electric lamps, he secured on the road a mean reading of 0·248 foot-candle, and for gas 0·279 foot-candle; while between the lamps along the kerb line the mean reading was 0·247 foot-candle for the electric arcs, and 0·250 foot-candle for the gas-lamps. There, again, the city councillors are faced with divergent results from the two experts; and, on the grounds stated by Mr. Abady, we have greater faith in the validity of his readings than in those with the instruments adopted by Mr. Harrison. But taking Mr. Harrison's horizontal maximum and minimum readings, we have only the difference, under present conditions, of 0·36 foot-candle and 0·11 foot-candle respectively to bring about absolute equality, though Mr. Harrison himself agrees that there is an "approximate equality" under present conditions. This being so, what will happen with the high-pressure lights properly equipped and adjusted, so that they get their full and necessary measure of pressure? The answer is that Mr. Harrison's "most important factor" will be materialized to such an extent that the flame arc lamps, with all their abuse of scientific illuminating principles to gain the day, must fall far short of the glory with which he has tried to invest them. We will not follow Mr. Harrison into any absurd comparisons between the old low-pressure gas-burners and alternate arc lamps alight after 11.30 p.m.

There is really little use comparing the figures as to costs as given in the reports. This is a point upon which the Council have less positive leading than on any of the others. Capital costs depend entirely upon the system of erection and the extent of installation; and the system of erection must take a subsidiary place to lighting efficiency. Where tramcars are running, to place lamps 27 feet above the surface of the road, and lighting the tops and not the sides of the tramcars, is a piece of absurdity and faddism which ought not to be tolerated in the City of Manchester. The capital costs given by Mr. Harrison for the high-pressure lamps are not those where high-pressure lamps are erected on standards; but we have not the figures by us relating to central suspension. We cannot see, however, that in an extensive installation, the costs would amount to the figure he quotes if carried out by competent contractors. Again, with high-pressure lamps giving their proper efficiency, it would not, the tests show, be necessary to have nearly so many high-pressure lamps per mile to give the illuminating power furnished by the Portland Street flame arc lamps. With proper efficiency, also, two-burner lamps, as Mr. Abady indicates, would do much better than the three-burner ones in use that are working, through leakage from faulty flexible tubing, practically at low pressure. Thus there would be some further saving there. The average distance apart of the trial gas-lamps is 107 feet; and Mr. Abady calculates that properly-working two-burner lamps could be placed 130 feet apart. This would average 40·6 lamps per mile, instead of the 49·34 defective pressure three-burner lamps estimated for by Mr. Harrison.

There is the question of running costs. Mr. Harrison, as we understand from the reports, is not willing to publicly discuss the figures as to the costs of electricity and gas as supplied to him by the respective departments. Mr. Abady, on the other hand, cannot reconcile certain of the fundamental figures handed to him by the Electricity Department; and he was rather desirous of investigating the whole matter. The Manchester City Council are not to be envied their task in having to pass judgment on the wholly inadequate evidence before them. In regard to the high-pressure lamps, costs of compression, maintenance, and labour have all a higher average with just a few lamps than with a large number. Touching this point, it is really ridiculous of Mr. Harrison, in a report of this kind, to say that the higher the pressure, the greater the labour and maintenance charges. For the life of us, under the pressure-governing conditions of to-day with high-pressure lamps, we cannot imagine whence he got the idea. Gas is supplied in some districts at a pressure of 80 inches and more; so that the farthest lamp away shall get the pressure for which it is regulated. The constancy so obtained has had a marked effect upon efficiency and all else appertaining to the lamps. Mr. Harrison also goes into some elaborate calculations, which are vitiated by the fundamental errors occasioned by the defective gas-lamps.

It seems absurd to reduce costs to "per lamp per hour" when talking about the lighting of the City of Manchester. However, bearing in mind what has been said as to Mr. Abady being unable to reconcile the costs for electricity on

the basis of load factor and division of fixed and running costs, we see that charging the electricity at 1·07d. per unit for half-night lamps (2000 hours per annum), and 0·655d. for whole-night lamps (4000 hours per annum), Mr. Harrison makes the cost of the half-night electric lamps come out to 0·9d. per hour per lamp, while Mr. Abady makes the figure 0·7d. Mr. Harrison calculates the all-night electric lamps at 0·7d. per hour; Mr. Abady, at 0·68d. For the defective gas-lamps, Mr. Harrison makes the cost come out to 1·5d. per lamp per hour—including compression charges which would not apply to an extensive installation; while Mr. Abady calculates the cost at 1·37d. per hour. These lamps are the equivalent of the half-night electric lamps. Therefore if the "important factor" in street illumination is "the "degree to which the street is illuminated," then it follows, with high-pressure lamps working up to double the efficiency of the leaky-connectioned ones in Princess Street, that the 1·5d. per hour would be cheaper—through the enhanced value given for the money—than the 0·9d. per hour for the electric lamps giving only half the duty. We are assuming that the electrical figures (which Mr. Harrison does not deem it his duty to publicly discuss, and which Mr. Abady has a difficulty in reconciling) are correct; and we are not calculating anything for the superior quality of the light from the gas-lamps.

There for the present the matter may be left, to see what the Manchester City Council will make out of reports which, taken together, are very inconclusive, and the bases of which are open to attack point by point. If it is thought that there should be central suspension above the tramlines, Mr. Abady is of opinion that arc lamps had better be adopted. But his own report shows that, in this way, the main streets and the citizens would be robbed of the light that stands unrivalled in illuminating efficiency and quality for street purposes. On the other hand, he evinces a desire to steer a middle course, by advocating extension on both systems. But illumination efficiency ought to come, in the street lighting of Manchester, before any equal distribution of favours; and we cannot see how on this efficiency question anyone can escape the lessons of the reports, which lessons have been emphasized by the defect in the flexible connections of the high-pressure lamps. In some respects we ought to be grateful to this defect.

The Sulphate Absentees.

THERE are good grounds for again asking those producers of sulphate of ammonia and ammoniacal liquor who are not yet subscribers to the funds of the Sulphate of Ammonia Committee to give renewed consideration to the matter of bringing themselves into co-operative unity with those whose provision of means for prosecuting propaganda work has resulted—this can be asserted without the slightest hestitation—in the financial gain of the non-subscribing makers. We have before shown the need for continual extension of the area of the Committee's operations, in the hope that this would bring into their subscribing ranks more of the non-subscribing beneficiaries. There are again before us some impressive particulars showing the need for the constant—and not only constant, but increasing—vigilance and activity of the Committee. During the last ten years, the combined British and German production of sulphate of ammonia has risen from about 350,000 tons to over 800,000 tons; and the total world's production from about 500,000 tons to about 1,150,000 tons. These are weighty figures. They represent—mark this!—considerably more than a doubling of production in a decade; and there are no visible reasons why the rate of progress should be lessened. But during the same period, the price of sulphate of ammonia has risen by from £3 to £4 per ton. This is satisfactory; but we have to look at these things perspectively. In what direction lies the hope, in view of still ascending production, of increasing and even maintaining the price? There is really only one answer; and that is by creating fresh demand. That is where the need of additional support comes in; and while the makers of sulphate of ammonia are in receipt of excellent prices for the commodity, is a favourable time for them to consider the economic question of the protection of this source of revenue by subscribing to the organization whose propaganda renders the most tangible protecting results.

The figures already given tell their tale of the efficacy of the Committee's work. The high level of prices prevailing during the last two years, and the fact that in 1911—in spite of certain adverse circumstances—the home consumption of sulphate of ammonia exceeded that of 1910 by nearly 10,000 tons, also contribute to the tale of efficacy. The Committee are again extending their operations. The only really adequate and unimpeachable means of maintaining prices is, as previously said, to continually open up new markets for the ever-increasing output. Excellent territory for remunerative operations, the Committee believe, is now offered by British India; and there they are initiating a vigorous campaign. They are also assisting in propaganda work in Belgium, Denmark, France, Germany, Holland, Norway, Sweden, and Switzerland. In Spain, the Committee are operating independently; while German sulphate makers are doing the same in Italy. It is also remarked that important work is being conducted in the United States by an Association of American Sulphate of Ammonia Producers, who may also shortly extend their sphere of action to other countries on the American Continent. It is unnecessary to say more as to the imperative character of the Committee's work, and of its extension. But the Committee must be supported in pursuing the constructive and progressive policy which has already proved successful. They cannot undertake additional work without incurring additional expenditure; and this cannot be incurred unless fresh sources of revenue can shortly be obtained, and relied on for the future.

Those sulphate of ammonia makers or ammoniacal liquor producers who are not subscribers surely will not be so foolish as to allow the Committee's work to be hampered merely to save the small levy of 9d. per ton of sulphate, or 9d. per million cubic feet of gas made (a million cubic feet being regarded as equivalent to a ton of sulphate of ammonia). Such a modest contribution renders it possible for all to join, and to help in the development of the work. Those who do not now work up their ammoniacal liquor are invited equally with sulphate of ammonia makers to join, because, where there is a free market, the value of ammoniacal liquor is regulated by the price of sulphate of ammonia. On this point, however, owing to recent developments, even the small producers of liquor would be well advised to become makers of sulphate of ammonia, and render themselves entirely independent (in respect of their liquor) of outside influences. It is an easy matter nowadays for them to do so. But that is, at the moment, a little beside the question. The main one is assistance in the development of the work of the Committee; and we do most earnestly appeal to those sulphate of ammonia producers who are not yet subscribers to take a hand in it. What men among the administrators of such works would have valuable machinery on them without insuring it; and yet they hesitate in taking their share in the most practical form of work of which we know of ensuring the maintenance of their prices for sulphate of ammonia. We urge, without distinction in the matter of size of concern, *all* producers of sulphate of ammonia and of ammoniacal liquor to be absentees from this work no longer, and to take the step at once of being enrolled in the list of subscribers.

Gas Companies' Protection Association.

THE Association has had a very busy year. It has, in fact, during the session had a finger in every parliamentary pie in which the gas industry has been concerned. The numerous matters were brought under review in the speech by the Chairman (Mr. H. E. Jones) at the annual meeting last Thursday; and they make a substantial showing in our report. When we come to think over the quantity of work the Association enters into as occasion requires, and the expenditure that the work involves, the latter strikes us as being a modest sum compared either with the amount of good done for the whole industry or the amount of financial saving effected to gas undertakings by the intervention of the Association. Most of the questions dealt with at the meeting have been so frequently the subject of discussion in our columns, and the facts are all so well known, that we will only refer to one of them—that is, the coming inquiry in connection with the restriction in residuals dealings. As has been pointed out before in our columns, the model clause has been altered so as to give effect to the intentions of the chemical clause; and, from what Mr. Jones says, this alteration appears to amount to a breach of faith on the part of the parliamentary authorities prior to the decision of the Joint Committee to whom this question of the chemical clause has been referred. As to this Joint Committee, the House of Lords has agreed to its appointment; and, as will

be seen by a subsequent paragraph, the members to represent the House of Commons have already been nominated. In regard to the representation of the gas industry at the inquiry, Mr. Jones also announced that a conference is about to take place at the office of Mr. Corbet Woodall, the President of the Institution of Gas Engineers and of the two other central organizations of the gas industry. There is no need to say that everybody must in this matter work with a right good will; for, as Mr. Jones says, if the gas industry does not get the verdict, it will be unfortunate indeed for the industry. It will be unfortunate, and that on one ground more important than any mentioned by Mr. Jones. This ground is that gradually, by the infliction of the chemical clause, no market will be open for the sale of the raw residuals products, save that controlled by the chemical manufacturers, who will thus rule prices, instead of leaving them to the law of supply and demand and unfettered markets.

Carbonization Studies.

THE big discussion has taken place on the paper that Dr. W. B. Davidson read at the spring meeting of the Midland Association of Gas Engineers and Managers, and which paper he subsequently expanded by three contributions to our columns. It may at once be said that the discussion did not rise to the level of anticipation in view of the large amount of work that the contributions of Dr. Davidson represented. It was expected that there would have been detailed criticism of the results of the work; but, to a large extent, the discussion took the old form of a battle on practical working results between horizontal and vertical retorts. But what Dr. Davidson tried to do in his research work was to get behind the practical results with both systems—horizontal and Dessau vertical—to endeavour to account for differences found in the results, and then to construct a rough balance-sheet, which he does not desire shall be taken as accurate. There is another point which has to be borne in mind in reading and interpreting Dr. Davidson's figures; and it is that the results put forward in the paper must not be taken as quantitatively correct, but only qualitatively so. There is still a further qualification; and it is that, when Dr. Davidson knows the Dessau plant as well as he knew his old horizontal large-scale test plant, he may be able to do much better with the former than the latter. We cannot expect that a man can work so well with a new plant, and get it to respond to his manipulation with the same certainty, as with an old plant with which he has had years of experience. But these various qualifications notwithstanding in construing the comparative research work of Dr. Davidson, he has, it must be admitted on all hands, added considerably, by his work, to (as Dr. Colman puts it) the inner knowledge of carbonization.

The main lesson to be drawn from last Thursday's discussion is that no system of carbonizing must be judged on its gas production ability alone, just as the merits of no system can be judged solely on what it can do with any particular class of coal. Dr. Davidson had put forward the view that, in regard to the illuminating power multiple per ton of coal carbonized, the Dessau vertical retort (he had not had personal experience of the other vertical systems of carbonizing) was inferior to that obtained from horizontal working, and the calorific power multiple somewhat less so. But in respect of bye-products, labour, wear and tear, sulphur compounds, naphthalene, &c., the vertical retort is the superior of the horizontal retort. It was singular to notice in the discussion the large amount of support the vertical retort received; the claims of the horizontal were hardly championed or advocated. Even those who are working with horizontals are looking to one of the vertical systems to supply the gas requirements of the future—the gas containing the largest proportion of combustible gas, while in its production the highest value in residual products is obtained. No one in the discussion—Mr. J. F. Bell, Dr. Colman, the Messrs. Glover, Mr. A. M. Duckham, Mr. John West, Mr. Vincent Hughes, or anyone else—would admit that Dr. Davidson had realized the best possible out of the Dessau retorts; and naturally, when some of the names mentioned are considered, it will be well understood that, when it comes to a question of dealing with a variety of coals, the continuous system of vertical retort working is said to allow a flexibility, owing to the power of regulation, *par excellence*. But to this Dr. Davidson replies that, in a large works where a great variety of coals from different sources are being delivered day by day, the advantage claimed is considerably nullified by circumstances. In choice of systems, therefore, the gas engineer must still remain, in a measure, the slave of circumstances. But, as we say, most speakers in the discussion look to one or other of the vertical systems to supply their needs in the future in relation to gas and at the same time value in residuals.

Whence comes the higher illuminating power multiple of which Dr. Davidson speaks in connection with horizontal retorts? From the more complete cracking-up of the tar vapours causing greater yield of unsaturated hydrocarbons. On this point of secondary decomposition, Mr. Bell prefers that less tar should be produced and more permanent gas obtained; and yet he says that, so far as gas-making is concerned, the Dessau system is the equal of horizontal working, and with steaming superior to it, though the illuminating power may be slightly lower. When we come to consider everything, we fail to see why Mr. Bell should require this secondary decomposition to take place to lessen the tar, when in gas he can already get the equivalent of horizontal working (in which secondary decomposition does take place) in the vertical retort, with more and an improved tar. Dr. Davidson is out for business; and he is not satisfied that, with the price of tar to-day, there is anything to be gained, but something to be lost, by depreciating the tar and liquor in quantity and quality in order to get a small extra gain in gas. What he wants is to procure the largest possible profit for the consumers and his employers from each ton of coal with which he has to deal.

This consideration leads us away from the illuminating power multiple to the calorific power multiple per ton of coal carbonized. The available working evidence points to this being greater with the vertical system of carbonization than with the horizontal; and this is the really important matter in these days. Dr. Colman advances one explanation for this; and it is that more water gas is produced from the coal in the vertical system of carbonization than in the horizontal system. The amount of steam, he says, produced by the decomposition of the coal, quite apart from external steaming, is always greater with verticals than with horizontals. And this larger production of water gas, with its additional heat units, tends to compensate for the lower yield of heat units through the tars not being cracked-up so much. But there is an additional reason for the enhanced calorific value of the gas produced in vertical as compared with horizontal retorts, and that is the lower percentage of inert gases in the former. It is true that the greater the amount of moisture in a coal, the greater the percentage of carbon dioxide produced; but it is equally true that, both in nitrogen and carbon dioxide, the vertical retort gas has, as a rule, a lower percentage content than horizontal retort gas. There is a fear that this fact, combined with some of the high makes in horizontal retorts that one sees, points to over-pulling. Dr. Davidson, now that he has full charge of a works, does not object to a little (but it must be a little) over-pulling. However, throughout the discussion, where this point was touched, there was antagonism—in the interests of the consumers and flame temperature—to over-pulling, and favour shown to dilution by end-charge steaming or by water gas. Looking at the whole matter from the practical and business point of view, the gas that can be diluted, and yet show a good flame temperature, owing to a low percentage of inert gases, is, in the opinion of Mr. George Helps, Mr. W. W. Townsend, and Mr. H. E. Copp, the gas for the future; and this gas is one which before dilution does not contain a large percentage of nitrogen or carbon dioxide.

There were quite a number of miscellaneous points in the discussion, in which the vertical retort people had it all too much their own way—whether or not they deserve an almost complete walk-over, it is unnecessary to say here. But the fact remained; and yet there was not much room allowed Dr. Davidson to show his championship of the horizontal retort with the same vigour as he has been enabled to do on previous occasions. After this discussion, we are wondering whether Dr. Davidson the investigator with a large-scale test-plant (whose thoroughness and enthusiasm all have admired) would be found to be quite the same person in views and practices as Dr. Davidson the manager of a gas-works. Whether or not he is so does not much matter. He has by his work helped to elucidate problems in carbonizing; and, whatever the position he occupies, he cannot divest himself of an inquiring mind, and the future will assuredly see him yet taking part in our carbonizing controversies

with views backed by his daily work as a responsible gas-works manager.

There is one other matter arising out of the discussion. Dr. Lessing was again the advocate of small-scale testing after the manner of the plan described in the paper he read at the Institution meeting last June. It will be remembered, however, that he claimed for his new testing apparatus and method some usefulness because, in certain respects, he had obtained approximately concordant results, from the same coal, with those given by Dr. Davidson in his Midland paper. But Dr. Lessing was relying on frail support. For the reasons stated during Dr. Colman's remarks in the discussion on Thursday, Dr. Davidson rejects his own tests in their quantitative aspect, and claims consideration only for them in their qualitative aspect. This being so, Dr. Lessing must find some other support for comparability. Furthermore, Dr. Davidson distinctly says that such small-scale tests are no good for valuing coals, although there may be service in them for settling little points. Though in some respects the discussion was disappointing on its controversial side, there are many excellent points to be gleaned from it by those who will take the trouble to read with care the mass of speech-making in what was a record discussion for the Midland Association.

The Residuals Committee.

No time has been lost in nominating the members of the House of Commons for the Joint Committee who are to consider the grievance of the gas industry in having the commercial control of the markets for their raw residual products placed in the hands of the purchasers—the chemical manufacturers. Not one of the proposed five members to represent the House of Commons has, we think, been on any of the Committees who have imposed the unjust "chemical clause" on gas undertakings; and so they will bring to their work quite independent and impartial minds. They form a well-balanced body whether regarded politically or in regard to their fitness to adjudicate upon a matter of this kind. Commerce and the law are strongly represented in them. There is Mr. J. W. Hills, who represents Durham City as a Liberal Unionist. He is a Solicitor. Then we have Mr. J. C. R. Lardner, who, as a Nationalist, sits in the House for Monaghan. He, too, is a Solicitor. Mr. W. R. Rea is the Liberal representative of Scarborough. He is a shipowner and lighterman with an extensive commercial knowledge. Mr. S. Roberts, the Conservative member for the Ecclesall Division of Sheffield, is a representative manufacturer in a large business in Sheffield. He is also a distinguished college-man, and was called to the Bar many years ago. Mr. G. R. Thorne, who sits as a Liberal representative for Wolverhampton, is a Solicitor. This part of the joint tribunal, at any rate, ought to have good judicial weight in the inquiry.

American Gas Institute and the Modern Trend.

The modern trend of things was well marked at the meeting of the American Gas Institute recently held at Atlantic City. This is seen from the sketch of the proceedings, written by an esteemed American correspondent, which we publish to-day. There seems to be a general feeling that the Institute has not, in its reorganized form, come up to expectations. These are times when commerce and technical work in the gas industry have such large interconnection, that an Institute that devotes itself almost exclusively to the technical side seems wanting, and does not satisfy, as a central representative organization. We realize something of this at home; it is realized profoundly among the advanced spirits of the American gas industry. They want their Institute to occupy its proper sphere as the representative organization; and there is hope that the National Commercial Gas Association of America will become merged in the Institute. In their case, too, it is seen—but is contrary to the experience in this country—that the affiliation of the State gas organizations has had but little value. They had evidently become too well established as separate entities. It is therefore proposed that no further affiliation agreements be made, but that instead District Sections of the Institute be formed. When we have before us the full report of the proceedings, it will be found that there will be several interesting matters to be considered, which will point to the universality of gas industrial movements. America has gone a long way in the adoption of calorific standards; but the Institute is making protest against some of the grandmotherly regulations of certain of the State Gas Commissioners. We have pointed out before that this tendency of the governing authorities in fixing, for instance, high calorific standards and compelling in some cases dual standards of illuminating and calorific power, are against the economic interests of the industry and of the community. But the Commissioners are hard to convince to the contrary. There appears to be a lack of knowledge as to true economic values, which are not always represented, particularly in gas supply, by high standards. The representatives of the Institute who have been considering the question of calorific values are in favour of the gross standards as opposed to net values; and we hope they will not allow the pedants to turn them from this view. One other point. There are to be great doings at the Panama-Pacific Exposition in 1915 at San Francisco; and the Institute has agreed to hold an International Gas Congress there then. Those gas engineers in this country or on the Continent who want to look forward to a good holiday and a good time in the autumn three years hence cannot do better than book up this as a possible engagement. We warrant those who go from here will have a hearty welcome.

The Development of the High-Pressure Lamp.

We like to see honour bestowed where honour is due. This being so, we should like to correct a false impression that is in possession of the mind of the Lord Provost of Edinburgh (Sir William Brown). At the opening of the Gas Exhibition in the Waverley Market, Edinburgh, at which his Lordship took central part, he referred to high-pressure gas lighting in appreciative terms. He regarded the high-pressure lighting of the exhibition as an important feature, and said that, from the view he had of it the previous night, he could confidently state that "nothing approaching it had ever been seen in Edinburgh before." But then Sir William proceeded to say that "he learned they were indebted, in large measure, to friends on the Continent for the results now procured, as they had had many of their cities lighted by the system for a considerable number of years." We are quite willing, and pleased always, to acknowledge the large indebtedness of this country and of the gas industry generally to our friends on the Continent for what they have done by inventive genius in advancing the interests of gas; but we must claim that the earliest of the most important advances in inverted high-pressure lamps was made in this country—an advance that raised the illuminating efficiency per cubic foot of gas consumed to a height that left predecessors in the rear, though they too have since become stronger competitive rivals, in point of efficiency, than they were at that time. But the great advance was made by Mr. James Keith; and Sir William Brown will be interested in learning that Mr. Keith is a Scotsman.

Redeemable Stock.

The House of Lords have lately decided a claim by a Bank who were the original holders of some Edinburgh Corporation 2½ per cent. stock, issued in May, 1897, that the Corporation were bound to redeem this stock immediately on the expiry of May, 1927, on the application of the holders thereof, and were not entitled to postpone the right of the holders of the stock to have it redeemed for any further period after that date. The reading of certain parts of two Acts of Parliament were involved. A section of an Act passed in 1894 contained the words: "The resolution for the first creation of Corporation stock shall provide that such stock shall be redeemable at the option of the Corporation at par after the expiration of a period to be fixed by the resolution not exceeding sixty years from the first creation of the stock." Then a section of an Act passed in 1896 provided: "The Corporation, in addition to the powers contained in the Edinburgh Corporation Stock Act, 1894, may, and they are hereby authorized at any time to, create and issue a new class of stock . . . and all stock of such class shall be redeemable at the option of the Corporation at one and the same period to be fixed by the Corporation, but not exceeding sixty years from the first issue of such stock." The Corporation maintained that they were under no obligation to redeem the stock, though had a right to do so at par after May 15, 1927; and consequently the holders of the stock had no right to have it redeemed. For the Bank, it was argued that the money borrowed by issuing stock must be repaid by the redemption of the stock at any period to be fixed by the appellants which did not exceed sixty years. They might leave the charge upon their

revenues standing for sixty years; but if they declared the stock to be redeemable on the expiration of a shorter period, they were equally bound to redeem on the expiration of the shorter period. In the first Court judgment was given for the Corporation, but on appeal this was reversed. The House of Lords have now unanimously restored the first judgment. The Lord Chancellor said the question which arose was as to the meaning of the word "redeemable" in the 1896 Act; and as he interpreted it, it was "at the option of the Corporation." The Court below treated the matter as if it could only be a question of the relation of debtor and creditor; but the word "redeemable" might impart a different meaning. The earlier Acts of the Corporation authorized the raising of money by means of annuities and mortgages. If the relationship was not one of debtor and creditor, but of buyer and seller of annuities, then the words that "such stock shall be redeemed at the option of the Corporation at par after the expiration of the period to be fixed by the resolution not exceeding sixty years" would naturally import repurchase at the option of the Corporation;" and he had come to the conclusion that this was the true view of the statute. Lord Halsbury said he was quite content with the single sentence in the Lord Ordinary's original judgment—"Anyone who alleges that a redeemable stock must be redeemed, is bound, in my opinion, to show the existence of the obligation upon which he founds; and this the pursuers [the Bank] have failed to do."

The Worthing Pipe-Laying Case.

In our "Legal Intelligence" to-day will be found a report of the judgment in the action brought by Mr. Schweder against the Worthing Gas Company, which raised the point of how far the soil below the surface at a certain part of the plaintiff's property was "land dedicated to the public use" within the meaning of the Company's Act of 1907. The case came before the Court a year ago; and the facts will probably be in the recollection of our readers. The plaintiff is the freeholder of some property which is in two portions separated by a lane leading from Worthing to Goring. In December, 1909, he built a subway under the lane, in order to connect the two sections of the property. The subway was 9 feet deep and 6 feet wide; and the roof was about 16 inches from the surface of the road. The defendants had laid a pipe against, and partly through, the subway; and the result of the first action was an order to remove the pipe, as it was a "building" within the meaning of the Gas-Works Clauses Act, 1847. Subsequently, however, they applied to the Court for a new order, and gave notice of their intention to commence relaying the pipe. The pipe was laid in a different manner; but the plaintiff submitted that by the arrangement adopted, the Company were occupying land which was not dedicated to the public use, and consequently were trespassers. The defendants' case was that, under their Act, public necessity had given to the land in dispute the quality of being dedicated to the public use. Mr. Justice Eve, who had the matter before him on both occasions, decided that the contention of defendants was correct, and dismissed the action, with costs. The injunction granted in the former case is suspended.

Physical Society's Annual Exhibition.—We learn from the Secretaries of the Physical Society, that this exhibition will be held on Tuesday, the 17th prox., both afternoon and evening.

Manchester Public Lighting.—The question of the appointment of a Lighting Committee was deferred by the Manchester City Council at last Wednesday's meeting until the 9th of November. The Nomination Committee recommend the appointment of five members from the Gas Committee, five from the Electricity Committee, and five others not being members of either of these Committees. The new Committee will take in hand the subject of the whole of the street lighting and the illuminant to be used. At the same meeting, the reports of the experts on the experimental street lighting in Portland Street and Princess Street, noticed at length in the "JOURNAL" last Tuesday (pp. 344-348), did not come up for consideration.

Amalgamation of Lighting Firms.—It will be seen, from an announcement which appears elsewhere, that arrangements have been completed for the amalgamation of the business of Moffat's Limited and that of the British Ross Mantle—the contract of the Patent Appliances Company for the agency for this mantle having terminated. The title of the new Company is Moffat, Ross, and Co., Limited; and the entire business has been transferred to more commodious premises at No. 209, Upper Thames Street, E.C. The Manager and Secretary of the Company is Mr. H. Kitley, who was long associated with Messrs. Moffat's; and the Managing-Director is Mr. C. W. Neumeister, who has been closely identified with the Ross mantle since it was placed on the English market.

PERSONAL.

Mr. HENRY FURNELL PEATY, M.Sc., Technical Assistant at the Hornsey Gas-Works, has been awarded by the Engineering Society of Victoria University, Manchester, the Past Student Silver Medal, for his paper on the "Theory of Tank Design."

There were 113 candidates for the appointment of Works Manager of the Altrincham Gas Company, for which applications were invited in the "JOURNAL" for the 15th ult.; and the Directors have selected for the position Mr. H. R. S. WILLIAMS, at present Manager of the Tyldesley Gas and Water Works, who will enter upon his duties early next month.

In response to the advertisement which appeared in the "JOURNAL" for the 1st ult., there were upwards of a hundred applicants for the position of Engineer of the Sittingbourne District Gas Company. Out of this number, the Directors selected Mr. ARTHUR H. ANDREWS, the Manager of the Milton Regis Gas-Works, who will enter upon his duties in a week or two.

Congratulations to Mr. and Mrs. CYRIL G. DAVIS. Last Tuesday at St. Martin's Church, St. Martin's Lane, W.C., the nuptials were celebrated (by licence) of Mr. Davis and Mrs. Sybil Christopher, widow of Mr. Cosby Christopher. In consequence of the recent family bereavement—prior to which the date of the wedding had been arranged—no invitations were issued for the ceremony; only members of both families being present.

OBITUARY.

The death took place last Thursday, at the age of 75 years, of Mr. CHARLES HART, who had been on the Board of the Leamington Priors Gas Company for twenty years—for the latter half of this period acting as Vice-Chairman. Deceased was a civil engineer, and in his younger days did much railway construction work. For the past thirty years he had resided in Leamington.

We regret to record the death of Mr. EDMUND S. PIKE, who for upwards of a quarter-of-a-century had filled the position of Secretary of the Reigate Gas Company. His first association with the manufacture of gas was in the Rhondda Valley, and he subsequently proceeded to Rastrick. About six months ago his health began to fail, and it became necessary for him to undergo an operation. He apparently withstood this well; but he succumbed to a recurrence of the trouble. Mr. Pike was much revered for his kindly disposition, and among the parochial duties he filled was that of warden of the Parish Church—a position he had held for ten years. At the funeral there was a large attendance of residents of Reigate, including members of the corporate bodies, neighbouring gas companies, and others. The deceased leaves a widow and three children.

WATER LEGISLATION FOR 1912.

IN preceding issues of the "JOURNAL," the principal features of the gas legislation of the session have been indicated. It now remains to deal with the Acts relating to water supply; and we take first those which affect companies.

The Dunstable Gas and Water Act confers on the Company parliamentary sanction for certain existing water-works, gives authority for the construction of others, and power to raise additional capital. The present works comprise a well and pumping-station, with a reservoir, &c., in the parish of Dunstable; and the new ones consist of another pumping-station, an adit or adits connecting it with the present wells, a service reservoir, and a conduit between the new pumping-station and the old reservoir. The Company are granted five years for the completion of these works. They may raise additional water capital to an amount not exceeding £15,000, to be limited to a dividend of 7 per cent. per annum if issued as ordinary, or 5 per cent. if as preference capital, unless a larger amount is needed so as to make up previous deficiencies. Power is given to borrow to the extent of one-third of the original capital existing at the time of the passing of the Act, and in like proportion as regards the additional capital; also authority to create debenture stock. The interest on borrowed money is restricted to 5 per cent. Section 22 of the Act gives further protection to the Luton Rural District Council. It is provided (*inter alia*) that if the Company neglect to make good any damage they cause to roads or bridges, the Council may, after seven days' notice, repair the damage, and charge the cost to the Company. The Council are not to be liable for damage done to the works of the Company by the ordinary use of a steam or other roller or traction-engine not exceeding 12 tons in weight. The Act contains purchase clauses, which have already been noticed in connection with the gas sections. [*Parliamentary Agents: Messrs. W. & W. M. Bell.*]

The Staffordshire Potteries Water Act gives the Company power to construct additional works, extend their limits of supply, and raise more capital. It also sanctions and confirms works which have already been carried out. These consist of a pumping-station in the parish of Norton-in-the-Moors, an aqueduct or pipe-line connecting it with the existing Brown Edge reservoir in the same parish, and another running from it to an enclosure, together with

all incidental pipes, filters, works, and apparatus. The new works are of rather an extensive character. They comprise two pumping-stations, to be situated respectively in the parishes of Eccleshall and Draycott-in-the-Moors, both in the county of Stafford, a service reservoir in the parish of Swynnerton, and six aqueducts or pipe-lines. Periods of seven and fifteen years were required for the completion of these works; but the Act specifies that they are to be carried out in the shorter period. The Company may extend their limits of supply so as to include part of the western portion of the parish of Checkley. Additional capital may be raised to the amount of £180,000, to be limited to 7 or 5 per cent. dividend, according as it is ordinary or preference, with borrowing powers to the extent of one-third; and the Company are authorized to create debenture stock. The Act contains a provision to the effect that if the owner, lessee, or occupier of any lands within a mile on either side of two of the pipe-lines comprised in the new works proposed to be carried out makes a request in writing, the Company are to supply him with water for domestic purposes at a rate not exceeding 7½ per cent. per annum on the rateable value of the premises to be supplied, and for other than domestic purposes at 1s. per 1000 gallons. Under their Act of 1853, the Company had power to charge additional rates in Stoke-upon-Trent. The section conferring this power is repealed; and, further, the Company are not to be entitled to charge more than 3s. per annum for a water-closet in a dwelling-house in the borough when the rateable value is between £6 and £8 per annum. [*Parliamentary Agents: Messrs. Batten, Proffitt, and Scott.*]

The only features calling for notice in the gas portion of the Swanage Gas and Water Act were briefly indicated in the "JOURNAL" for the 15th inst. (p. 220). In respect to the water portion, the Company have obtained authority to construct additional works, comprising a well and pumping-station in the parish of Arne, three adits, a service reservoir to be situated in the parish of Corfe Castle, and two aqueducts or pipe-lines; and they are granted five years within which to complete them. The use of a well situated under the premises of the Company at Swanage is to be discontinued, and the well permanently closed to the reasonable satisfaction of the Urban District Council. The charge for water is to be based upon the rateable value of the premises. Where this does not exceed £7 per annum, it is to be 8s. 8d.; and above £7, it is not to be more than 8 per cent. of the rateable value. When the new works are completed, the charge on houses above £7 rateable value is to be 10 per cent. For every closet beyond the first, the Company may charge up to 5s. per annum, and for a 50-gallon bath not more than 12s. Authority is given to raise additional capital to the amount of £39,000 (£45,000 was named in the Bill), to be entitled to 7 or 6 per cent. dividend according as it is raised as ordinary or preference, with borrowing powers to the extent of one-third. The Act contains provisions in regard to the purchase of the water undertaking by the District Council; and if they promote a Bill next session with this object, it is not to be opposed by the Company except for securing the insertion of protective clauses. If the necessary powers are obtained, the Council are to give three months' notice to the Company. The purchase price is to be as agreed upon or as settled by arbitration, *plus* the costs incurred in obtaining the Act under notice (so far as the water undertaking is concerned) and the transfer of the undertaking. If this takes place, the name of the Company will, of course, be changed to the Swanage Gas Company. [*Parliamentary Agents: Messrs. Sherwood and Co.*]

The Tendring Hundred Water Act sanctions an extension of the Company's limits of supply so as to include the parish of Dedham, in the rural district of Lexden and Winstree, and the parishes of Wrabness and Little Bentley, in the rural district of Tendring. It also confirms the construction of a well and pumping-station near Manningtree, and of an elevated tank near Frinton-on-Sea. The Company obtain power to make new works, consisting of a well and pumping-station at Dedham, a water-tower in the parish of Wix, and four aqueducts or pipe-lines; and they are allowed seven years for their completion. The Act confirms the acquisition of certain lands in the parishes of Dovercourt, Great Oakley, and Tendring; and the Company may use them for the general purposes of their undertaking. They also have power to purchase additional lands; but the total quantity held must not at any time exceed 40 acres. Authority is given to raise additional capital to the amount of £120,000, to bear a maximum dividend of 8 per cent,; to borrow to the extent of one-third; and to create debenture stock. [*Parliamentary Agents: Messrs. Rees and Freres.*]

By the Windermere District Gas and Water Act the Company obtain authority to raise more capital and to construct additional works. The sum of £7500 is the maximum amount allowed, inclusive of premiums; and it is to be issued in shares of the nominal value of £10 each. The dividends specified are 7 and 6 per cent. respectively for the ordinary and preference capital. Borrowing powers to the extent of one-third of the issued capital are given, as well as authority for the creation and issue of debenture stock. The new works specified are an impounding reservoir, the enlargement of an existing reservoir, three conduits or pipe-lines, two roads, and the diversion of the stream known as Dubbs Beck, on which the present reservoir stands, and on which the new one will be constructed. The Company are granted five years for the completion of these works. The Act contains provisions for the acquisition of the Company's undertaking by the Urban District Council. [*Parliamentary Agents: Messrs. Speechly, Mumford, and Craig.*]

ELECTRICITY SUPPLY MEMORANDA.

Medical Men and Gas Heating—"Direct Confirmation" of an Electrical Prediction—A "Startling Development"—Wire-Drawn Differences in Justification—Water Heating—The "Peculiar Qualities" of Gas—Stagnant Air again.

THE "Electrician" has a little weakness for prophesying; but when it has exercised its prognosticating power in connection with the affairs of the gas industry, the reverse has generally happened. It has been rather dazzled—perhaps one ought to say dazed—by the figures given by Mr. Creasey in his British Commercial Gas Association paper, which recorded the fact that no less than about 2500 doctors in the Gaslight and Coke Company's area are to-day using the modern economic and hygienic gas-fire. Our contemporary has been rather at a loss to know what to say about this after the drivelling remarks of electrical origin as to the supposed enmity of the doctors to gas-fires. So it says meekly and harmlessly enough that the gas-fire is not the last word in heating, and that the average medical man will not be slow in finding this out. This portends something terrible for the gas industry. We suppose that what is meant is that the electric form of heating, without ventilation, will eventually be found by medical men to be the "last word." Of course, we all have our own points of view; we have also our own rules for, or modes of, appraising the intellectual capacity of our fellows. But we should like to draw the attention of our friends to the fact that Mr. Creasey's story of the progress of the conversion work among the doctors merely dates back to 1908-9, when he could only claim 1054 doctors as patrons of gas heating; the other 1500, or thereabouts, being the converts of the last three years. Electric radiators have been known longer than this; therefore it is quite evident the doctors do not at present believe that electric heating is "the last word in heating"—and ventilation and healthy conditions. Perhaps, too, our contemporary who foresees this coming *volte face* on the part of the faculty is not aware that there are those medical gentlemen who have not found that the electric radiator gives them heating value for the money expended; that there are some of them who, after experience with a single modern gas-fire have enlarged their experience by adopting more; and that there are many of them who are in thorough agreement with Dr. Leonard Hill that a fire that requires a flue, and assists in maintaining movement and change in the air at the living level of a room is the most hygienic form of heating that can be obtained. Science must always prevail over assumption and fallacious reasoning.

The gas industry will not regard as a ruinous incident to its heating business a trivial matter that the "Electrician" brings out with unfeigned pleasure. It is referred to as a "direct confirmation" of its remarks as to the gas-fire not being the last word in heating. This is the "direct confirmation:" The Medical Officer of Health of Marylebone has reported that, as a result of the fumes arising from gas-heating apparatus—not fires—with consequent overheating and bad ventilation at certain conveniences in the borough, he recommends that electric radiators be adopted as a way—not as the only way!—out of the difficulty. There are points about this "direct confirmation" that are rather interesting. Does it not strike our contemporary as being strange that the Medical Officer has apparently only recently discovered these fumes, overheating, and bad ventilation? If he found them before, why did he not make the recommendation earlier? Let the "Electrician" be frank on commonsense grounds, and say that additional business for the Municipal Electricity Department is the weightiest reason of all for making the change. Otherwise, it would be a serious reflection upon those municipal officers of the Borough of St. Marylebone who had allowed the represented condition of things to go on for any length of time. The satisfactory and economic use of gas-heating arrangements in numerous other conveniences, without fumes, overheating, and bad ventilation, shows that the described condition of things could have been remedied, and, in fact, gas heating can be made to render yeoman service in helping in the much-needed ventilation of some of these places. It is remarkable what terrible and wonderful revelations are made concerning gas in the effort to serve municipal electricity departments. We should like to ask the Medical Officer of Health for Marylebone whether his knowledge has not had time to comprehend the fact that there can be gas heating without obnoxious gas fumes, over-heating, and bad ventilation? Because if it has not, he must be a busier man than many of his fellows, whose beliefs were at fault at one time on this subject, but who have, on the demonstration of their erroneousness, changed them for something more genuine. These medical officers are also sufficiently broad-minded to agree that what can be done in one place can be done in another; and, apart from that, 3440 B.Th.U. can only be obtained under the best conditions from a unit of electricity, while 16,500 B.Th.U. can be obtained from a pennyworth of 2s. 6d. gas of 500 B.Th.U. per cubic foot—whether the gas is used in an underground convenience or elsewhere.

The Westminster City Council have been patient and long-suffering over some of the electric lighting in their area. The Works Committee have been considering the question of exercising the option of the Council to determine the contract of Sept. 19, 1899, with the Charing Cross Electric Supply Company, for public lighting in the parish of St. Martin-in-the-Fields and a portion of the Strand district at the fourteenth year of the contract, which has a full run of 21 years. But it seems that it is inadvisable to

consider the curtailing of the contract, unless the Council contemplate taking over the undertaking to the extent referred to in clause 14 of the contract. That settles the point. But there is another one that is not so clearly understood. The Committee are considering the possibility of improving the lighting under the contract. Now clause 1 of the contract says the Company are to provide the lamps with electricity of an energy of not less than 500 watts per hour, and giving an actual minimum and continuous candle power of at least 1000. This is only 2 candles per watt! But the reports of testings in the City of Westminster only credit the old open type of arc lamps with less than 500-candle power. The Company have changed some of the lamps to flame arcs; but there are all the remaining ones. Now the Company are to be asked upon what terms they will be prepared to improve the lighting, and to guarantee a standard of light to be agreed upon. It looks very much as though, when the first clause of the contract is considered in relation to the illuminating power tests, the Council need not put the proposition before the Company in this way; but they could use the alternative of asking them what they are prepared to do in the way of carrying out clause 1 by providing lamps using 500 watts per hour, and giving a light of at least 1000-candle power. If the Council compel the strict observance of the contract, there will be a great improvement in the illumination of the streets that have not been treated to modern lamps. Those that have been so treated, it is remembered, came in for the change just at the time the electrical industry was startled by the illuminating disclosures of modern types of high-pressure gas-lamps. It will be useful to see what is done in the matter of the illumination guarantee.

Those who remember the birth of the Metalite Company, the claims as to the performance of their lamps made in advertisements, the pretensions of the writers of the advertisements as to the overwhelming superiority of the metalite lamp over modern incandescent gas-burners in respect both of economy and lighting efficiency, and the financial harvest that was to accrue to those who invested money in the Company, will be interested in knowing that the Company are now suggesting that they have in hand a metallic filament lamp which is going to knock all rival electric lamps off the face of the earth. We have learned to take the Company's announcements with a grain of salt, which is quite natural and a blameless act of caution after the licence exhibited in the early days. The new lamp, it is stated, will show an efficiency of 0·6 to 0·8 watt per British candle power. It is stated that the filament is of the squirted category, and is made of a metal alloy not previously applied to filaments. Reading between the lines of its notice, we are not very certain that the "Electrical Times" is altogether satisfied by an experiment carried out with a sample lamp. The lamp was a 50-candle power one at 100 volts; but it was found that the bulb was hotter than ordinarily, which points to either an imperfect vacuum or an overrun filament. A 100-volt lamp of this new type has only three squirted filaments, instead of the six usually required for a squirted filament; and the high-voltage pattern has only six loops. There are other claims, among them one for exceptional mechanical strength. Our contemporary calls the lamp a "startling development." It surely ought to control itself better than that—at the present stage.

We know that fine-drawn distinctions have sometimes to be found when constructing a case in justification; but fine-drawn differences justifying charges for electricity used for various purposes are sometimes most extraordinary. Readers have often been introduced to Mr. Seabrook's telephone system of charging, which is practically the same thing as other precursory lump-sum systems and so much per unit afterwards, which Mr. Seabrook did not invent. However, under the telephone system, the private resident is charged for cooking ½d. per unit; and the business consumer for cooking is charged from 1d. to ¾d. No one can know the wonderful contortions of his mental faculties that our friend Mr. Seabrook had to undergo to determine that there really were differences which justified a higher price for energy in business premises than in private residences. Sufficient to say he arrived at the conclusion. But latterly Mr. Seabrook's mental faculties have been indulging in more gymnastic feats; and the outcome is a complete reversal of the former finding. Now he says there is no necessity for the difference, as the value to the electricity undertaking of the two classes of load is equal so far as cooking is concerned. It might happen that, if Mr. Seabrook put his mental faculties under further torture, he would find something else. However, at present it has been decided that business premises under lighting shall have electricity for cooking, under the telephone system, at ½d. per unit—that is, a primary charge, *plus* ½d. per unit. We wonder, while not suggesting for a moment that it has, whether the account for electricity in the kitchen of the firm of Debenham has had any influence in assisting in destroying the argument that originally found favour for establishing a difference in cost between residences and business premises. We do not know. Experience, however, has a marvellous knack of helping one to change one's opinions. In regard to electricity used for heating, there is a difference, Mr. Seabrook thinks, in the value of the load to the station for maintaining, under the telephone system, a charge of ½d. per unit for residential heating and 1d. per unit for heating business premises. But the owners of business premises who like to fool away their money on electric heating, and choose to encourage the belief that they are getting the current at ½d. per unit, can do so by allowing an addition of 20 per cent. to be made to the primary charge. Mr. Seabrook accounts for the 20 per cent. as representing the increased fixed charges due to a portion of the heating load overlapping the lighting load. In business premises, too, there is not a seven-day heating load, but only five to five-and-a-half. On these points there must be less overlapping of the heating load with the lighting load in business premises than in private premises; there must be a more continuous load for heating than for cooking in winter; and the five-day-a-week character of heating applies also to cooking. However, we need not cudgel our brains examining the fine distinctions that Mr. Seabrook is, with masterly ability, able to discover as they suit his commercial purposes.

An "Electrician" has communicated to the "Electrical Review" the startling piece of intelligence that he has boiled a quart of water, in a kettle with copper bottom and sides, on a gas-ring. The temperature of the water was 58° Fahr. when put on; it took 7½ minutes to reach boiling-point; the gas used was 2·17 cubic feet, which cost, at 1s. 11d. per 1000 cubic feet, 0·05d. That is not far out, although with 2s. 6d. gas we have boiled a quart of water frequently at no greater expense. The correspondent of our contemporary asks if anyone can furnish him with particulars of a similar test with electricity. Numerous similar tests are available, which show that, while the time occupied in boiling a quart of water is nearly tripled with electricity, the cost is somewhere about 0·3d. at 1d. per unit. The results of tests at the offices of the Society of Medical Officers of Health, described on Oct. 22 (p. 279), are the latest published.

The world is all the better for the fact that there is no universality of point of view in regard to any subject. If there were any universality of point of view, we should make but slow progress along any one of the evolutionary lines. In an article on "Commercial Development as it Should be Done," the "Electrical Review" makes appreciative reference to the thoroughness of the British Commercial Gas Association. "The point" our contemporary wishes "to emphasize is that, while the electrical people with an ideal commodity for sale, are temporizing with the question, the gas people, *although handicapped by the peculiar qualities of their product*, are proceeding to carry out, with energy and success, precisely the policy we have so often urged upon the former—preaching, alas! to deaf ears." Our sympathies are with the "Review." But about those "peculiar qualities" of our product. We are wondering which they are. Are they found in the superior heating property of gas compared with electricity, the ease with which the heating agent can be transmitted in any quantity, its economy, its reliability, its remarkable ease of application, its promptness in rendering service, or what are they? The "Review" might enlighten us. Peculiar properties! Well, well! the "Review" is responsible for its own follies.

The Council Chamber of Brighton is not by any means a new place; but it may be taken that it is electrically lighted. The members of the Council have found, as did the members of the Sheffield Council a time ago, that the ventilation of the chamber sadly needs improving. It seems that there are electric-fans in use at the present time; but the Borough Surveyor, in consequence of the complaints, proposes to carry out various alterations to the roof, and to introduce more fans. And this with those lights in use that are praised sky-high for not contributing harmless products of combustion to the atmosphere, while their non-contributory power in aiding ventilation electricians keep snugly hidden away in the background. It is a case of stagnant air again, which the learned ones are telling the world is most unwholesome, and dangerous to health.

Incandescent Gas v. Electricity for Composing-Room Lighting.

The "Master Printers' Circular" recently referred to the paper read by Mr. Justus Eck, at a meeting of the Illuminating Engineering Society last March, and noticed in the "JOURNAL" at the time, on the lighting of printing works by electricity. In the course of it, Mr. Eck said he had visited a number of works, and all the engineers, managers, and other officials he had questioned on the improved lighting conditions, replied that without their present form of lighting they could not produce as rapidly and as cheaply as now, and that it was inconceivable to turn to any other form of illuminant. In the hand-composing room the increased illumination, without glare or perceptible increase in the temperature, had not only resulted in a more rapid output, but also in improvement in the eyesight of the compositors. The Editor of the "Circular" offered the following comments on the matter: "Mr. Eck had naturally only investigated composing-rooms where electric lighting was installed, or he would have found more than one large composing-room in London where an electric installation had been replaced, after experiment, by incandescent gas. This is found to give a more diffused light, to be less trying to the eyes, and more satisfactory to the compositors, besides effecting a very large saving in the lighting bill."

Alderman Charles Gabriel Beale, of Messrs, Beale and Co., solicitors, of Birmingham and London, and Chairman of the South Staffordshire Water Company, who, as already recorded in the "JOURNAL," died on the 1st of September, aged 69, left estate of the gross value of £135,637, of which the net personalty has been sworn at £110,820.

COOKERY AND FOOD EXHIBITION.

THE first feeling experienced by the writer on visiting last week the Royal Horticultural Hall, Westminster, S.W., where the twenty-third Universal Cookery and Food Exhibition was being held, was one of astonishment that twelve months should really have passed since last he had seen all the wonders of the confectioner's and the cook's art, and the different appliances used in connection therewith, which are displayed on these occasions. Yet it is true—another twelve months has gone by! This, however, is a personal reflection; and as it has nothing in particular to do with food or cookery, it need not be pursued further. Cooking, of course, is an everyday matter, though, at any rate with some of us, not such cooking as is undertaken by those who exhibit at the shows organized by the Universal Cookery and Food Association (under the direction of Mr. C. Herman Senn), with the object of awakening public interest in the art of cookery, and placing it in a position worthy of its increasingly vital importance to national health and progress. This object concerns everybody; for all must eat, and even vegetarians would hardly care to take all their food uncooked. That being the case, it is not to be wondered at that the popularity which has been seen to attach to previous exhibitions remains undiminished—in fact, rather increases—as time goes on. A good cook is a distinct gain to the community; while a bad one is—well, naturally, quite the opposite. But there should be no bad cooks nowadays. Excellent facilities exist for acquiring the art, and equally excellent apparatus for practising it. Gas-stoves, which are under perfect control, and which can be used for any length of time without fatiguing labour or the soiling of hands or clothes, have done much to render the cook's a pleasant occupation; and their utility was, as usual, amply demonstrated and tested at last week's exhibition. Perhaps some day it may be possible to say the same of the electric cooker, who can tell? But, except to the electricians, it does not matter much whether or not this comes about, as gas is able to do, at a reasonable cost, all that is required.

As has hitherto been the case, one of the principal features of the exhibition was the various competitions held. There were competitions for army cooks, military hospital cooks, naval cooks' mates, school children, fish cooking, bakers, egg and omelet preparation, sauce making, pancake making, and potato cooking; while, besides these, special sections were devoted to condensed

[*Photo. by Tella Camera Co*

A WELL-ARRANGED GAS EXHIBIT.

milk cookery and banana cookery. The whole of the competitions were carried out with gas-cookers. The same remark applies to the international display of bourgeoise or home cookery of various Continental nations, given each afternoon in the demonstration kitchen in the lecture-hall; the demonstration lectures by expert chefs, given each evening, when luncheon, dinner, and supper dishes were prepared; the model kitchen, where the chef in charge prepared daily *recherché* dishes, and offered useful and instructive information to visitors; and the people's kitchen, where cheap and wholesome food for the working classes was cooked daily, with a view to affording practical illustrations as to how nutritive and economical meals, costing from 1s. to 1s. 4d. for a family of seven, could be prepared.

The model demonstration gas kitchen in the lecture-room was fitted up with two Main and one Sugg gas-cookers; and the seats were arranged round the front and two sides of the apparatus, so that everyone could see and hear well. The numerous demonstrations (which included Austrian, French, Hungarian, Italian, and Swiss cookery) were very well attended; and there must have been few indeed who could not find something to learn in so varied a programme as was provided. In lighting the kitchen, New Inverted burners, with Telephos switches, were used; and hot water was furnished by a "Califont" geyser, attached to a sink. Messrs. Still and Sons supplied the various utensils. In one of the annexes was the kitchen in which the military and naval competitions were held. This was fitted up with Main double cookers, and a "Califont" geyser. On the other side of this annexe was the people's gas kitchen, in which food was cooked daily by a special staff of chefs appointed by the Cookery and Food Association. There were here a Main double cooker, three Fletcher-Russell stock-pot hot-plates, and an Arden-Hill "Janus" bread and pastry oven. In the other annexe there was the gas kitchen of the Shipping Federation, where merchant ship cooks gave demonstrations of cooking on a Wright's "Eureka" double cooker—hot water being provided by a Sugg boiler of 12 gallons capacity, with draw-off cock. In connection with the last-named displays, it may be remarked that one chef who had been a cook on board ship for the past ten years, and had had no practical experience with gas-cookers, found no difficulty whatever in cooking on the gas-apparatus provided everything necessary for his demonstrations. Another appliance deserving mention was a gas-steam Vienna bread apparatus, for baking French rolls, &c. In this the steam

circulation is obtained by means of a Fletcher-Russell high-power gas-ring.

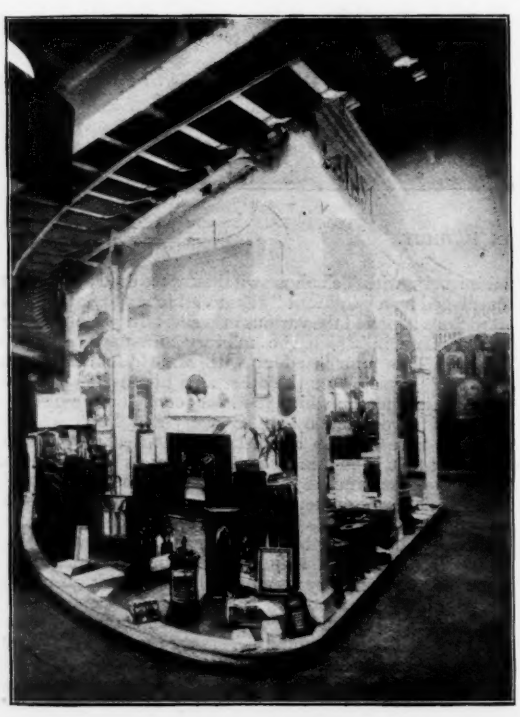
In addition to fixing all the gas-stoves and the hot water apparatus, and fitting up the demonstration kitchen in the lecture-hall, the Gaslight and Coke Company on this occasion had a stand of their own in the body of the hall. Situated in perhaps the very best position, and arranged tastefully on well-considered lines, this proved highly attractive to the visitors, numbers of whom were induced to make inquiries on various points of those in charge. The scheme of arrangement will be gathered from the accompanying illustration; and the photograph from which this was reproduced was so admirable that further description is really hardly needed. The intention was that the stand should provide a display, in actual operation, of everything that the Company are prepared to do. Of course, it was pointed out to callers that the things on view were only meant to represent types of appliances, and that there were numerous other makes of cookers, fires, circulators, &c. The advantage of showing just one piece of apparatus of each kind was that there was afforded plenty of scope for decorative effect; and this was taken full advantage of. Having the appearance of a handsome room (rather than a shop-window), it successfully caught the eye and secured the attention of visitors to the exhibition. The fire was a Wright's "Thermo X.," fitted with duplex burner and side-ring, and provided with a bronchitis kettle. On the other side was a Main enamelled cooker of the newest pattern. A Wilson circulator was connected to a 25-gallon tank, supplying a lavatory basin; and it was kept working the whole of the time—the taps being frequently turned on and off. Then there was a little "Brilliant" geyser, with spray attached for shampooing, to illustrate how simply and rapidly a supply of hot water can be secured for toilet purposes. For illuminating the interior of the stand, there were four double brackets, with New Inverted 80-candle power burners, with beaded shades. These burners were lighted and extinguished on the Telephos system, which continuously all day long was being put in and out of action. In addition, general high lighting was provided by six of Sugg's electro-plated indoor burners, which are specially suited for churches, halls, &c. These were operated on the pneumatic system. On the floor, a standard lamp, with a handsome old-gold shade, was fitted with an upright Welsbach burner, so that visitors might have explained to them the different styles of lighting. There were in attendance a lady adviser and two members of the sterner sex acting in a similar capacity; and a notice on the stand invited people to step inside and consult those in charge on the use of gas for all purposes. It is gratifying that the Company were rewarded for their efforts by the large number of practical inquiries received.

Among the individual exhibitors, a number used gas-stoves for preparing their specialities; and it was really remarkable to see how much they were able to do in the small amount of space at their command. Several exhibits besides that of the Gaslight and Coke Company may be briefly mentioned. Messrs. Arden Hill and Co. had a stand on which they showed their "Zenith" self-contained water-boiler, the "Calefactor" hot-water circulator, cake-plates, the "Janus" oven, and the "Mars" self-contained gas-heated steam radiator. The lighting was by New Inverted burners. At another stand, Messrs. R. & A. Main made a special feature of their fountain water boiler, with which they claim it is impossible to make coffee unless the water is boiling, as only boiling water can be drawn from the apparatus, which is automatic in its action. The boiler has no inside tubes to get choked up; and to clean out, it is only necessary to undo two nuts, and remove the manhole plate. The consumption of gas when the water is boiling is only 9 cubic feet an hour. It is a suitable appliance for hotels and restaurants; and another handy thing for similar places is their quick griller and toaster, which can be combined with a hot closet if desired. The firm also drew attention to their "D.S.O." series of gas-fires, as well as to the "St. Nicholas" and "Santa Claus" patterns, and to their "St. Mungo" gas-heated steam-radiators.

Then the Washing-Up Machine Company exhibited a novel machine for cleaning table ware. A tank of water (heated by a gas-ring) is provided; and in this the plates or other articles, having first been put in a wire basket, are placed. The water is then agitated for the requisite time, by the turning of a handle, after which the wire racks are removed from the tank, and the contents left to dry. Elsewhere Messrs. Richard Crittall and Co. displayed their continuous water-boiler for caterers, and a gas-heated coffee-making machine. The "Econocooker" is an apparatus which consists of seventeen parts—not including a fire. As a matter of fact, the fire, though a necessary part of the operation of cooking, does not strictly speaking form a portion of the apparatus, the heating elements of which are three metal discs, ribbed on one side. These discs are heated on any kind of stove (gas does excellently for the purpose), the ribbed side being placed downwards. They must be heated until water dropped on them flies off. A heated disc is then taken and placed, with the ribs upwards, on the tray which forms the bottom of the "cooker." The saucepans are placed on the disc, one above another, with an aluminium lid on top. Over the whole is placed a bell cover, which should fit well down on to the tray, and is not to be removed until the food is cooked. For roasting or baking, two discs are used—one above and one below the vessel containing the meat. The operations enumerated are perhaps not quite so quickly carried out as merely placing the utensils on a gas-cooker; but then various advantages are claimed for this new method—which, however, can only be judged by an actual trial.

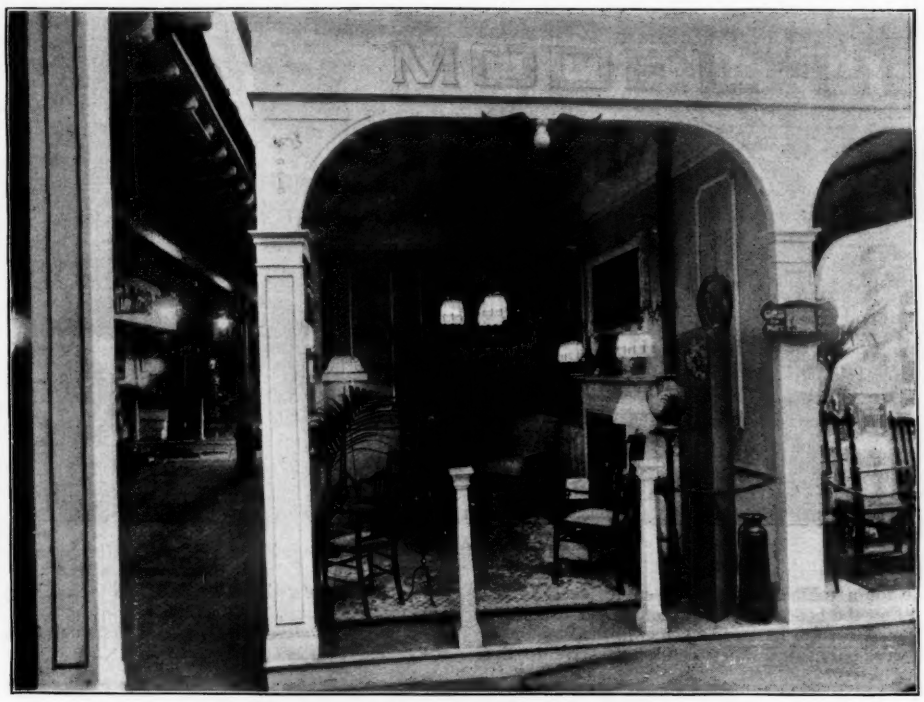
GAS EXHIBITION IN EDINBURGH.

After a highly-successful run, the gas exhibition promoted by the Edinburgh and Leith Corporations' Gas Commissioners was closed on Saturday evening. Since the opening day, the Waverley Market has been thronged by great crowds of visitors. One gratifying result of the enterprise, so far as the Commissioners are concerned, has been that a large number of orders have been booked for the installation of gas-cookers, gas-heating stoves, &c.



The Corporation Stand.

Show-Case illustrating Window Lighting.



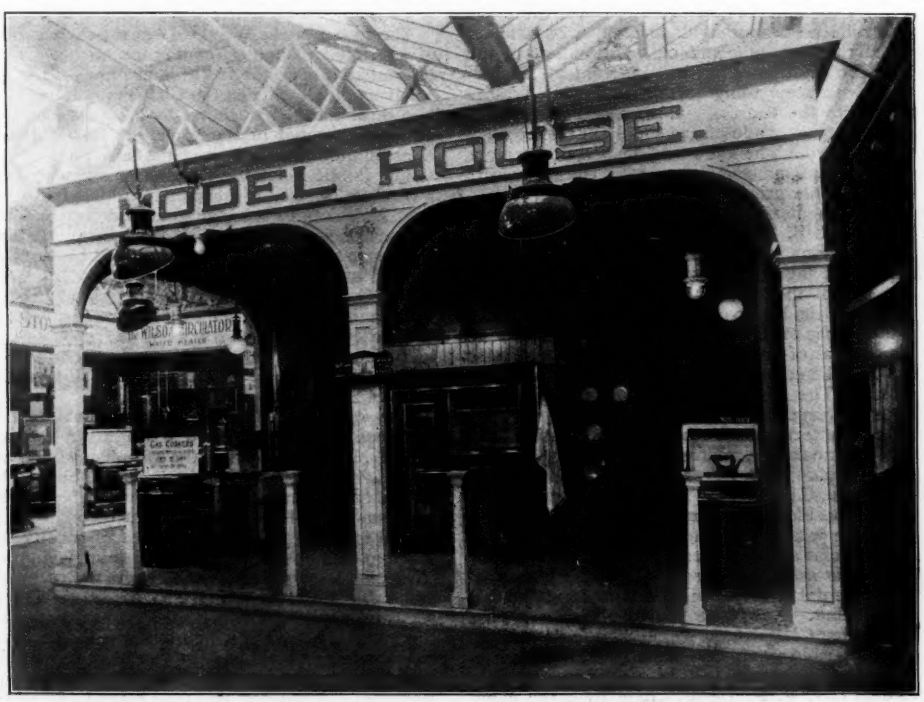
Drawing Room in the Model House.

LECTURES BY MR. HENRY O'CONNOR.

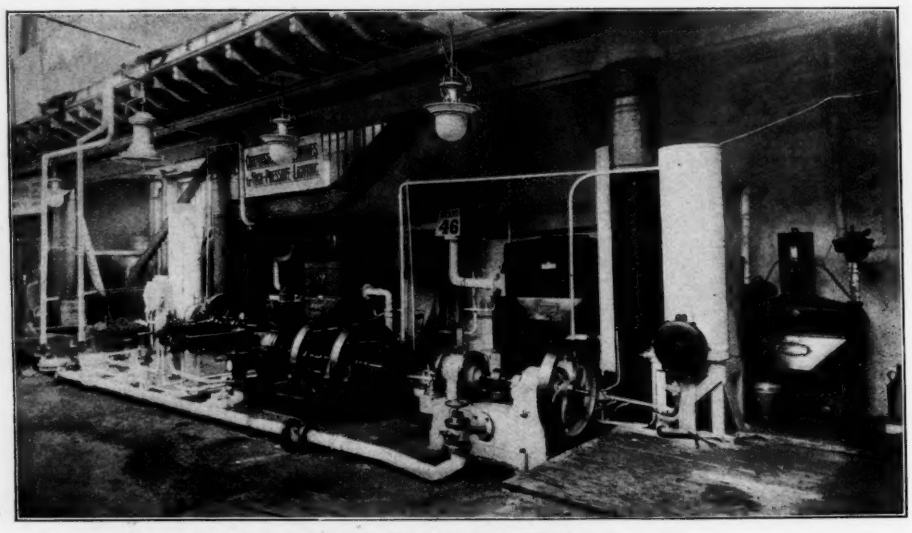
The lectures by Mr. Henry O'Connor were listened to with marked appreciation by large audiences. In his first lecture, speaking on the comparative efficiencies and costs of gas and electricity for lighting, heating, and power, he pointed out that electric plant must be large enough for the maximum supply; while all that was necessary for gas plant was that it should be ample for the average hourly supply. On a comparison of cost of gas and electricity for lighting, he brought out the figures as: Gas 1¼d., electricity 2¾d. The liability to breakdowns in plant of the electric light were cited, and the hygienic value of gas was demonstrated by showing that the air was purer than with electric light. The difference in the glare of gas as contrasted with electric light was given as being 1-34th from gas-mantles less than from metallic filament lamps. The advantages of lighting from a distance was next referred to; and the steadiness of the flame of gas as contrasted with electric light was demonstrated.

Dealing with the subject of heating, the lecturer mentioned that boiling by gas can be done at one-fifth the cost of electric boiling. The extra time for cooking by electricity as compared with gas was also quoted; and on the question of cost it was shown that gas cooking was more economical. The concluding part of the lecture dealt with electric motors and gas-engines; and the superiority of the latter was shown by practical references and details.

The second lecture dealt with the economical utilization of gas for lighting, heating, cooking, and other domestic purposes. Treating the mantle as the foundation of the economical use of gas for lighting, the lecturer described the process of manufacture, the necessity for the choice of a good mantle, and showed how to choose a good burner and how to clean it. The shape and material of the globe were referred to, and distant lighters exhibited. The effect of the colour of wall paper upon the light reflected was shown by a special photometer. The advantages of high-pressure gas were shown, and so also was the fact that the air in gas-lighted rooms was purer than that in electric-lighted rooms. The three forms of heating and the merits of radiant heat were fully detailed, and the advantages of gas-stoves pointed out. Anthracite stoves were next found fault with—first, on account of the small quantity of air which they required for combustion, being less than 100 cubic feet, so that the stove, as regarded its ventilation,



Kitchen in the Model House—Showing the Combination Range, with Roasting Oven, Hot-Plate, Circulator, and Gas-Fire.



The Gas Compressors and Engines.

was only suitable for a room or box of 31 cubic feet. It was further explained that the heat was all convected, and that there was the possibility of carbon monoxide being formed—showing that such stoves were only satisfactory where perfect ventilation was already assured. The use of gas for cooking and boiling was explained in detail.

The lectures were fully illustrated throughout with examples of the different apparatus referred to.

THE AMERICAN GAS INSTITUTE MEETING.

SEVENTH ANNUAL MEETING.

[Communicated.]

Of old, seven was considered the perfect number. Certainly perfect was the weather accompanying the seventh annual meeting of the American Gas Institute. Held as it was at Atlantic City, New Jersey—first among the many beautiful pleasure resorts that dot our Atlantic Coast—the bright and warm October days were doubly welcome, as the meeting programme included games for which good weather was essential.

The meeting head-quarters were at the Marlborough-Blenheim Hotel, to which, on Tuesday, Oct. 15, members found their way—first in small numbers, and then in an avalanche in the late afternoon, with the arrival of the three special trains containing over three hundred persons. These special trains are becoming a feature of our National Gas Association meetings; and they add considerably to the pleasure of the long journey required of some of the members.

More than four hundred were gathered on Wednesday morning in the solarium of the hotel, in view of the sparkling ocean, when the meeting was called to order by the President—the Hon. Ira C. Copley. He introduced Mayor William Riddle, of Atlantic City, who welcomed the Institute, and called attention to the growing demand for the taxation of unearned increments, including franchise values. In responding to the Mayor, Mr. Walton Clark bore testimony to the decrease in price and increase in service to consumers, characteristic of gas supply in this country during the forty years of which he knew—a 60 per cent. decrease in price, accompanied a 40 per cent. increase in candle power; and this in the face of higher-priced raw materials.

As the Committee on the next place of meeting were appointed Messrs. W. H. Gartley, R. B. Brown, and R. C. Congdon. The Secretary then read a communication from the children of the late Mr. W. R. Beal, signifying their desire to continue, in the name of their father, the gift of the "Beal Medal," which is available annually to the author of the best paper read before the Institute, provided that such paper is of sufficient merit. Mr. C. H. Nettleton then read a memorial of tribute to Mr. Beal. As a printed report of the Board of Directors was in the hands of the members, it was not read. The membership is now 1410; and the cash balance stands at $3273.86.

Mr. E. C. Jones, of California, as a special representative from the Pacific Coast Gas Association, addressed the meeting, to urge that the Institute participate in an International Gas Congress to be held at San Francisco, California, in 1915, in connection with the Panama-Pacific Exposition. The Institute voted that such a congress be held in the week beginning Sept. 27, and that the incoming President appoint a Committee, to act with the Pacific Coast Association. It is not too early to express the hope that our British and Continental *confrères* will be able to attend this congress in goodly number. It will be held the week after the International Engineering Congress, at which engineers from all over the world are expected; and this should be an added inducement for foreign gas engineers.

The Vice-President (Mr. V. F. Dewey) then took the chair, while the President delivered the annual address. He dwelt principally on the condition of the Institute itself, and, showing that its income must be increased or its scope decreased, argued for the increase of both income and scope. He recommended the appointment of a Committee, to revise the constitution, to the end that the Institute should occupy its proper sphere and represent all phases of the industry. The address was referred to Messrs. Walton Clark, S. J. Glass, and C. M. Cohn as a Committee to consider its recommendation and report back to the Institute. Their report, adopted at a later session, empowers the incoming President to appoint a Revision Committee. This action will, it is hoped, finally result in a merger of the National Commercial Gas Association with the Institute, and give the latter an organization adequate for its work, all in time to have but one National Gas Association to act as host in 1915.

Following the President's address came the report of the Nominating Committee, the unanimous adoption of which resulted in the election of the following officers:

President—W. R. Addicks, New York.
First Vice-President—J. M. Morehead, Chicago, Ill.
Second Vice-President—C. N. Stannard, Denver, Col.
Secretary and Treasurer—George G. Ramsdell, New York.
Directors (to serve two years)—W. H. Gartley, Philadelphia, Pa.; W. E. M'Kay, Boston, Mass.; R. M. Searle, Rochester, N.Y.; Irwin Butterworth, Detroit, Mich.; E. C. Jones, San Francisco, Cal.

The report of the Wrinkle Department was offered in the shape of a printed pamphlet, containing an index to the "Wrinkles" presented at previous Institute meetings—thus making them more easily available. Then the Chairman of the Bureau of Information reported that, as shown by the questions and answers of the past year printed in the "Institute News," the Bureau had been of assistance to a number of the members.

The Public Relations Committee advocated a revision of the "Uniform System of Accounts" adopted by the American Gaslight Association, reported that a digest had been made of the various decisions of the Wisconsin Public Utilities Commission, and recommended that similar digests be made of the decision of other State Commissions.

The Committee appointed to investigate the provisions of the constitution with respect to affiliation between the Institute and the various State Gas Associations, reported that this provision had been of little value, and recommended that no further affiliation agreements be made, but that, instead, there be formed District Sections of the Institute.

The report of the Trustees Gas Educational Fund announced the election of Mr. Emerson M'Millin as a Trustee, succeeding the late Mr. Beal. With this, the morning session adjourned.

The afternoon having been left open for entertainment features, the Institute reconvened in the evening. The first item of business was to authorize the Committee on Next Place of Meeting to make their report subsequent to adjournment. Next, Mr. J. B. Klumpp, for the Committee on Calorimetry, presented a printed pamphlet of 110 pages, embodying the results of two years of admirable work, requiring, in connection with previous reports, 2000 tests. He announced that, as an appendix to the report, there would be issued a set of detailed instructions for operating calorimeters. He asked for the discharge of the Committee, as it had accomplished the work for which it was appointed, and the testing of calorimeters was now being undertaken by the Bureau of Standards. The Institute decided, however, that the Com-

mittee on Calorimetry was too valuable a servant to dismiss, and continued it.

The report of the Committee on Thermal Value and Candle Power was next in order. It was presented by the Chairman, Mr. W. H. Gartley, and was a well-reasoned argument for the use of the gross, as opposed to the net, heating value, with a protest against the tendency of our governing bodies to adopt standards of calorific values at variance with the conservation of our natural resources and the economical production of gas, and far higher than those prevailing abroad. A joint discussion, centring largely on the inadvisability of a double standard, took place on the reports of both Committees. Among the speakers was Mr. William M'Clellan, the Engineer of the Second District of the New York Public Utilities Commission. His statement—that, in considering all gas-supply requirements, the fact must never be lost sight of that the consumer pays in the end—may be commended to some other State Commissions showing an undue tendency to "grandmotherly regulations."

Then, with great interest, the Institute heard Dr. Edward B. Rosa, of the Bureau of Standards, on "The Legal Specifications for Illuminating Gas." This was principally concerned with candle power *versus* heating value requirements, and stated: "We are therefore disposed to recommend retaining a minimum candle power requirement as a secondary standard, in addition to the more important heating value standard;" and with a comparison of total, gross, and net heating values with a statement more favourable to the use of total heating value than has previously been issued by the Bureau. The discussion lasted nearly an hour, and was of a most valuable character. In connection with this, the Institute voted that the Committee on Public Relations appoint a Committee of seven (two of whom should be engineers), to confer with the Bureau of Standards regarding the proposed revision of its Circular 32, which contained suggestions for gas-supply regulations. This concluded the evening session, which, as will be noted, was concerned entirely with questions of gas composition and supply, and which held for three-and-a-half hours the close attention of about three hundred persons.

On Thursday, the Institute met in two sections—Section A, with the President in the chair, devoting itself to manufacture, and Section B, under Vice-President Dewey, considering distribution questions. In both sections, morning and afternoon sessions were held. In Section A, the first business (over from the night before) was the report by Dr. E. P. Hyde of the action taken by the Institute to induce the International Photometric Commission either to confine its work strictly to gas photometry and take the initiative in calling a conference representative of all illuminants affected by photometric work, or else to enlarge its own scope in this direction. He stated that there was good reason to believe the latter step would be taken.

The Committee on the Beal Medal for the 1911 meeting awarded it to Mr. L. E. Worthing, for his paper on "Some Principles of Condensation, with Especial Reference to Water Gas." Then Mr. C. O. Bond, in a paper on "The Photometry of Incandescent Gas-Lamps," described the apparatus and methods in use at the Photometrical Laboratory of The United Gas Improvement Company. The discussion centred on the desirability of uniformity in the quality of gas, the use of higher distribution pressures with individual consumers' governors, and the more complete removal of sulphur compounds.

The "Effect of Various Diluents upon the Candle Power of Oil Gas," by Dr. A. H. Elliott, was next considered*. The paper described experiments made to ascertain the "effect the so-called diluents in illuminating gas had upon the illuminating power of such gas." The discussion brought out corroborative results by another experimenter, and the fact that in all such work the candle powers obtained were those of the particular combinations of gas and burner rather than those of the gases themselves.

The morning session came to a close during the reading, by Professor Carl C. Thomas, of a communication on "Recent Developments in Gas Measurement." The reading was resumed at the opening of the afternoon session. The paper described a meter, invented by the author, which "depends for its operation upon the principle of heating the gas electrically through a fixed range of temperature as it flows through a passage." The discussion was confined to particular phases of the construction and operation of the instrument described.

Mr. W. H. Blauvelt, in his paper on "The State of the Art in Coal Gas Manufacture," included a description of the Koppers coke-oven plant at Joliet, Ills., and of the Semet-Solvay gas-oven plant at Waukegan, Ills. The discussion was long, and dealt with fuel results in various plants, the local considerations influencing choice of type of apparatus, and the importance of standard methods of reporting results and of the formation by the Institute of a Committee on Carbonization, to obtain and comment upon the results from differing types of installations. Right in line with the discussion was the report of the Carbonization Tests Committee, whose recommendations were referred to the new Technical Committee.

The session closed with a paper on "The Value of a Weight Balance in Coal Gas Manufacture," by Mr. C. J. Ramsburg, in which the author makes a weight-balance of the results from two vertical retort installations. The discusston was principally concerned with the relation between the amount of fixed carbon shown by a proximate analysis of a coal and that of the coke actually obtained from the coal, and with the effects upon hydrocarbons of exposure to radiant heat as compared with contact with heated surfaces.

Section B opened with a description by Mr. H. B. M'Lean, of the "Industrial Gas Appliance Laboratory of the Consolidated Gas Company of New York." Here existing appliances are demonstrated to, and new appliances developed for, prospective consumers. The paper was copiously illustrated by forty-nine views. The discussion brought out the importance of the personal element in the successful operation of such a place.

Then followed the report of the Committee on the Utilization of Gas Appliances, read by the Chairman, Mr. W. J. Serrill. This treated of ranges, water-heaters, room-heaters, and lighting fixtures, and emphasized the considerations of safety in their use. A specification fixing certain minimum requirements for gas-ranges was recommended and adopted, as was also the recommendation that the Institute appoint a Committee to consider the question of additional requirements. This report occupied both the end of the morning and the beginning of the afternoon session.

The Committee on Small Gas-Engines gave data of the uses of engines smaller than 25 H.P., and emphasized the advisability of gas companies pushing the sale of these engines. The Committee on Consumers' Meters presented figures to show that the use of saturated gas, instead of air, for testing meters removed from service was a refinement on present methods that was worth considering. After this, Mr. C. W. Andrews, in the course of his paper on "The Effect of Cold Weather on the Gas Industry," said: "Our experience proves that, by proper cooling, service stoppages can be done away with, except during the time the frost is coming out in the spring." The discussion showed that the thawing of gas services by electricity had not proved successful; also that wood alcohol was superior to denatured alcohol to remove frost stoppages. This ended the sessions of Section B.

On Friday morning, the Institute met again as one body, and listened to a paper on "Public Service Commissions," by Mr. A. S. Miller—a protest against the tendency in our governing bodies to base gas prices "solely on the value of property being used, and to ignore the value of the service to those receiving it, [which] militates against the installation and extension of all public service corporation plants, and removes the incentive for economical and efficient management."

In his paper on "Heat Balance of a Carburetted Water-Gas Set," Mr. O. B. Evans presented a repetition of the test first made by Mr. A. G. Glasgow in 1890, but now carried out on "slightly different lines, with modern methods of manufacture, and using a setting of recent design." "The Analysis of Water-Gas Purification Material," by Mr. E. C. Uhlig, was undertaken to ascertain the comparative value of several methods for the determination of sulphur. The last item on the regular programme was the report of the Committee on Allowed Strains in Gasholder Designs. This recommended the standardization of holder specifications in a number of points.

The adjournment was preceded by the usual votes of thanks to the officers and the Committee who had given time and thought to the arrangements for, and the conduct of, the meeting.

As was said at the beginning, the social features of the meeting were greatly enhanced by beautiful days. Wednesday afternoon was devoted by the golfers to a handicap match for a silver cup donated by one of the members; by the baseball element to a game between two teams of members representing the East and the West; and by those to whom neither game appeals, to riding, walking, or any other available diversion. Certainly both the golfers and the baseball "fans" enjoyed their afternoon. Thursday night was the occasion of the banquet, at which over three hundred attended and were royally entertained. Though the meeting closed on Friday noon, quite a few members lingered until Sunday night, so resistless was the lure of sky and sea.

A "good meeting" was the general opinion, and one laying the foundation for much work of great future usefulness to the gas industry and the public it serves.

* The text of the paper will be found in another part of the "JOURNAL," p. 442.

Mr. J. T. Weatherall Foreman, the General Manager of Messrs. Alexander Wright and Co., Limited, has been elected a member of the Institution of Mechanical Engineers.

We learn that Mr. Corbet Woodall has resigned the chairmanship of the Trinidad Oilfields, Limited, but will retain his seat on the Board. The Hon. Thomas Cochrane has been appointed to succeed him as Chairman.

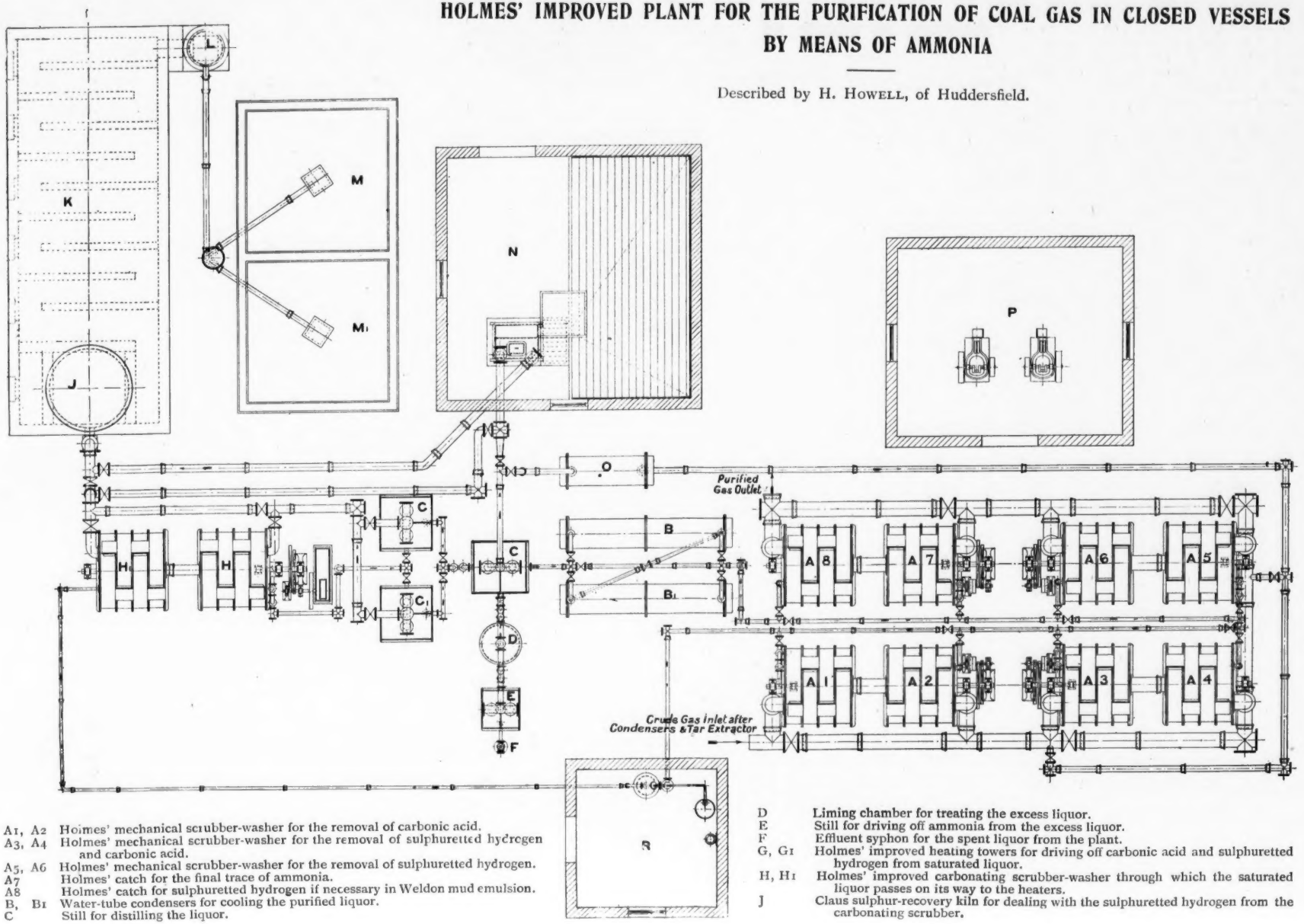
The Oldham Corporation Gas Committee have decided to become guarantors to the extent of £100 for the National Gas Exhibition to be held by the Institution of Gas Engineers in London next year to commemorate their Jubilee.

The General Purposes Committee of the Textile Institute, whose head quarters are in Manchester, are arranging a series of meetings for the winter months in different Lancashire and Yorkshire towns to discuss the relative merits of steam, gas, oil, and electricity in the driving of textile mills.

The first ordinary meeting of the Institution of Civil Engineers for the session 1912-13 will be held this evening at the Institution of Mechanical Engineers, Storey's Gate, S.W., when the President (Mr. R. Elliott-Cooper) will deliver his Inaugural Address, and the medals for papers, &c., will be presented.

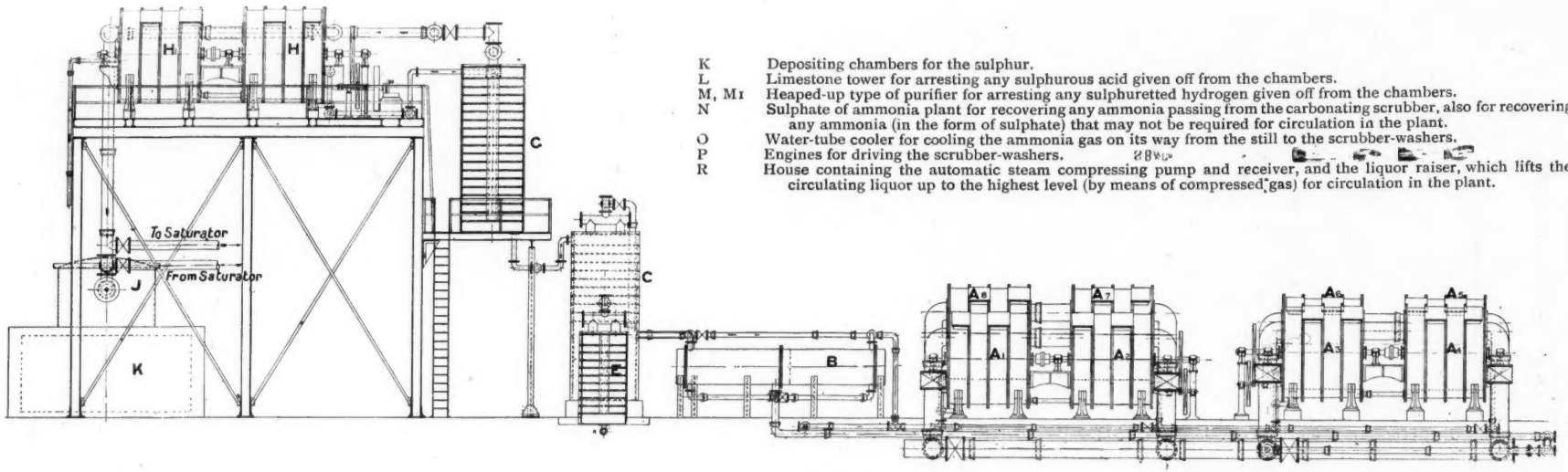
HOLMES' IMPROVED PLANT FOR THE PURIFICATION OF COAL GAS IN CLOSED VESSELS BY MEANS OF AMMONIA

Described by H. HOWELL, of Huddersfield.



A1, A2 Holmes' mechanical scrubber-washer for the removal of carbonic acid.
A3, A4 Holmes' mechanical scrubber-washer for the removal of sulphuretted hydrogen and carbonic acid.
A5, A6 Holmes' mechanical scrubber-washer for the removal of sulphuretted hydrogen.
A7 Holmes' catch for the final trace of ammonia.
A8 Holmes' catch for sulphuretted hydrogen if necessary in Weldon mud emulsion.
B, B1 Water-tube condensers for cooling the purified liquor.
C Still for distilling the liquor.

D Liming chamber for treating the excess liquor.
E Still for driving off ammonia from the excess liquor.
F Effluent syphon for the spent liquor from the plant.
G, G1 Holmes' improved heating towers for driving off carbonic acid and sulphuretted hydrogen from saturated liquor.
H, H1 Holmes' improved carbonating scrubber-washer through which the saturated liquor passes on its way to the heaters.
J Claus sulphur-recovery kiln for dealing with the sulphuretted hydrogen from the carbonating scrubber.



K Depositing chambers for the sulphur.
L Limestone tower for arresting any sulphurous acid given off from the chambers.
M, M1 Heaped-up type of purifier for arresting any sulphuretted hydrogen given off from the chambers.
N Sulphate of ammonia plant for recovering any ammonia passing from the carbonating scrubber, also for recovering any ammonia (in the form of sulphate) that may not be required for circulation in the plant.
O Water-tube cooler for cooling the ammonia gas on its way from the still to the scrubber-washers.
P Engines for driving the scrubber-washers.
R House containing the automatic steam compressing pump and receiver, and the liquor raiser, which lifts the circulating liquor up to the highest level (by means of compressed gas) for circulation in the plant.

A NUMBER of years ago Mr. Frank Clarke Hills tried at the Old Kent Road Gas-Works, London, to perform the operation of purifying coal gas in closed vessels by means of ammonia. He met with a fair amount of success. At a later date, Mr. Claus, on an improved process, erected a plant on a commercial scale at the Birmingham Gas-Works, and at the Belfast Gas-Works. This latter plant was designed to treat three million cubic feet of gas per twenty-four hours, with a view to proving that the whole of the acid constituents could be removed from coal gas by means of ammonia dissolved in water.

These plants partially failed, due to the following (among other) causes:—

(1) Plants improperly designed, and faulty in construction.

(2) Inadequate in capacity.

(3) The tower scrubbers were not suitable for the work required, as the distributing arrangement constantly clogged, and it was impossible to clean them without opening up the scrubbers and thus losing a large amount of ammonia. The distribution of the liquor in large-diameter scrubbers of considerable height, although perfect at the top, is anything but perfect half-way down the scrubber. At the Belfast Gas-Works, there was perfect distribution at the top of each of the scrubbers; but half-way down, there was not half the coke that had been wetted during the whole time the plant was in operation. The liquor passed into large streams, and flowed down through the coke or down the plates of the scrubber; the gas passed through the coke which had been unwetted and thus reduced the washing capacity of the scrubbers considerably. Other difficulties arose in connection with this defect, as blocks of carbonate of ammonia were formed in the dry interstices of the coke, and remained there in a solid state; and this ammonia was therefore lost to circulation. In case the streams of liquor changed their course, and dissolved the carbonate, the enormous amount of ammonia would suddenly be brought into circulation, and thus disarrange the whole working of the plant.

(4) The leakage due to the necessity of using a large number of pumps for lifting the liquor from the bottom of one scrubber to the top of the next in series. It was found impossible to keep these pumps tight, due to the action of the liquor on the plunger-rods of the pumps—thus causing very considerable leakage and loss of ammonia.

In spite of the defective design, leakage, &c., of the plant at Belfast, 1½ million cubic feet of gas per day were purified with a total removal of carbonic acid and sulphuretted hydrogen; and if such a result can be obtained in an imperfect plant, I think with an up-to-date plant, of the best design and construction, under skilful management, the process could be assured.

The plant here illustrated would carry out the process perfectly, as it is arranged so that nearly the whole of the circulating liquor is not required to be pumped, but gravitates through the plant—thus obviating the necessity of pumping the liquor from vessel to vessel, as in the Belfast plant, with the disastrous loss of ammonia mentioned.

The plant embraces the latest design of modern brush-scrubber for taking up the ammonia, carbonic acid, and sulphuretted hydrogen, as the liquor in circulation would be compelled to come into more intimate contact with the gas than would be the case in the tower scrubbers, and there would be no fear of pockets of carbonate of ammonia being formed, as mentioned in the case of the tower scrubbers.

The other portions of the apparatus, for heating the liquor with a view to removing a maximum amount of carbonic acid and sulphuretted hydrogen with a minimum of ammonia from the saturated liquor, are of an improved form. The interior of the several vessels is easily accessible, and the overflows are arranged externally to allow for cleaning purposes. The still for the distillation of the liquor and the return of the ammonia to the plant, together with the carbonating plant, are the most modern design, and are fitted with cleaning-out doors at the side. All overflows are external, and are fitted with examination doors and frames, so that any necessary cleaning can be done in the minimum amount of time.

The drawing and the attached schedule are self-explanatory. The gas enters the plant at A1, passing through each scrubber-washer in rotation to the outlet from A8, where it arrives freed from carbonic acid, sulphuretted hydrogen, and ammonia. The purified liquor is run into A8 and traverses the scrubber-washers in a contrary direction to the gas, taking up the impurities in each vessel on its way to the outlet at A1. The liquor thus saturated with the impurities from the gas is then treated for the removal of the carbonate and sulphide of ammonia; while the maximum amount of ammonia is retained in the purified liquor. This operation is performed in special heating towers, where the temperature of the saturated liquor is raised to about 195° Fahr.—thus driving off the maximum amount of carbonic acid and sulphuretted hydrogen and retaining in the liquor the maximum amount of ammonia.

The saturated liquor, before entering the heating towers, passes through the carbonating scrubbers, where it meets the hot gases from the heating towers, and washes out any ammonia that may have been given off there; and, at the same time, the ingoing liquor is considerably raised in temperature.

The carbonic acid and sulphuretted hydrogen passing away from the carbonating scrubbers, after cooling, go forward to the

Claus kiln, where the sulphur is recovered from the sulphuretted hydrogen as in the well-known Claus plant.

The liquor, after treatment in the heating towers, passes through a still, where the whole of the remaining ammonia is driven off, and the purified liquor required to be used again in the plant is cooled and returned to circulation. The ammonia gas driven off is cooled and returned to the scrubber. The excess of liquor not required for circulation is heated in the bottom portion of the still and treated with lime for the recovery of any fixed ammonia, which is returned to the plant; or if not required to be again circulated, the ammonia is sent forward to the sulphate of ammonia plant, for the purpose of making sulphate of ammonia. The waste gases from this plant also go forward to the Claus kiln for the recovery of the sulphur; and the excess of spent liquor is discharged into the sewers.

Where it is necessary to raise the liquor from one level to another in the proposed plant, the operation is performed by compressed gas—there being no pumps used.

NEW GAS-WORKS AT LINDEN (HANOVER).

Opening Ceremony.

THE ceremony of opening the new gas-works of the Imperial Continental Gas Association at Linden, near Hanover, was performed on Wednesday last, Oct. 30, by the Chief Burgomaster of Linden, Herr Lodemann, and was attended by the members of the Town Council and many other local officials.

Mr. WILLIAM ANDERSON, the General Manager for the Association in the Hanover district, in welcoming the guests in the name of the Imperial Continental Gas Association, stated that the great advance of the Linden district in industrial importance fully justified the demand of the inhabitants for a gas-works of their own. The building had been commenced in May, 1911, and had been entirely planned in the technical offices of the sister-works at Hanover; and it had been carried out entirely under the direction of the Company, and as far as was possible by Linden firms—only the iron-work, apparatus, and gas and other holders being given to outside contractors. The present maximum make was nearly 1½ million cubic feet; but space had been left to increase the works six-fold. Ample room and good light were provided for in all the buildings, and special attention had been paid to giving healthy surroundings for the workmen. The works being very up-to-date, a maximum amount of work was done by machinery; and all possible precautions had been taken to avoid unnecessary noise and dust. The parts of the property now unoccupied were later to be laid out as gardens. Mr. Anderson concluded by remarking that—as the works were eventually to be handed over to the town—the inhabitants could well be proud of them; and this he could state without incurring the reproach of speaking in such glowing terms of something with which he had personally (as representing the Association) been closely identified.

Herr LODEMANN then declared the works open, and expressed the satisfaction of the local authorities.

An inspection of the work followed—special interest being evinced at the working of the vertical retorts.

In the evening a banquet was held at a local hotel, when the distinguished guests of the afternoon were present, others including the authorities of the surrounding communities, Herr Körting, the former Manager for the Association, Geh. Regierungsrat Liebrecht, the Agent of the Imperial Continental Gas Association, and other officials of the gas-works. The toast list included the names of Herr Körting, Mr. Anderson, Herr Henke, the Works Engineer, and Herr Kuhfuss, the head of the Linden office.

National Gas Exhibition, 1913.

A meeting of the Executive Committee of the forthcoming exhibition—comprising the Provisional Committee who have been dealing with the matter and representatives of gas undertakings which have subscribed a minimum of £200 to the guarantee fund—was held on Wednesday last, at the offices of the Institution of Gas Engineers. Mr. F. W. Goodenough was unanimously elected Chairman of the Executive Committee; and Mr. H. M. Thornton, J.P., was appointed Deputy-Chairman. It was reported that several additional contributions to the guarantee fund had been received from gas undertakings since the meeting at Manchester; and it was decided to invite those who had not yet contributed to do so, in order that the requisite amount might be obtained to ensure the complete success of the exhibition. Finance and Organizing Committees were appointed, and considerable progress was made with regard to the arrangements generally. A preliminary prospectus will shortly be issued, in which the general plan of the exhibition will be outlined.

The London and Southern District Junior Gas Association will next Saturday afternoon visit the East Greenwich works of the South Metropolitan Gas Company. On Friday, the 22nd inst., there will be a business meeting at the Westminster Technical Institute, when Mr. A. R. Griggs will read a paper on the "Measurement of the Flow of Gases in Mains by Means of the Pitot Tube." Time permitting, there will also be a discussion on subjects introduced by the President (Mr. D. J. Winslow) in his address at the opening meeting of the session.

REPAIRS AND MAINTENANCE IN GAS-WORKS.

PART II.

By a WORKS ENGINEER.

WE now come to the question of "repairs and maintenance," with which this series of articles is mainly concerned. It is a subject to which the gas-works engineer pays a great deal of attention. He realizes that much of the cost of making gas is contained under this heading, and, besides, breakdowns of plant, with all the attendant troubles, depend to a considerable extent on the attention which this matter receives. The whole question is so closely allied to manufacturing results that the writer feels that no apology is due for dealing at some length with a number of the details involved.

To emphasize the importance of the matter, it will not be far from the truth to assert that actual repairs and maintenance, apart from the other items which are, as already shown, so often included, will amount to about one-third of the total works cost of making coal gas—that is to say, in the case in question the works cost will amount to about 6d. per 1000 cubic feet, which is not far from the actual figure at the present time. The inclusion of carburetted water-gas charges in the figures already given lowers the proportion which repairs and maintenance bears to the cost of making gas. Nevertheless, the importance of the question will not be gainsaid. So far as the writer can ascertain, very little consideration has been given to this item of expenditure, if papers and articles in the Technical Press are taken as evidence on the point. Various details in connection with wear and tear are, however, matters of common discussion between gas men, and many helpful hints may be obtained by comparing notes. In the following columns, the writer has attempted to put forward certain views on the use of various materials and appliances based on his own experience, together with the cost of each class of material per thousand cubic feet of gas made, for purpose of comparison.

	£	Per 1000 Cubic Feet of Gas Made, £	d.
Fire-bricks and fire-clay materials	531		
Fire cement and anti-thermic cement	58		
Retorts	258		
Oil gas blocks and bricks	20		
		887	0·212
Joists, angles and tees, plates, and bars	160		
Sundry ironmonger's goods	322		
		482	0·115
Cast-iron pipes and fittings	74		
Steam and hydraulic pipes and fittings	186		
Gas-lamps, mantles, and fittings	59		
		319	0·076
Machinery renewals		246	0·059
Lubricating oils and grease	157		
Red and white lead, colza, linseed, and general oil stores	75		
		232	0·055
Castings		179	0·042
Timber		125	0·030
Cocks and valves		168	0·040
Packing and jointings		111	0·026
Chain repairs		108	0·025
Building materials		79	0·018
Paint		71	0·017
Clogs and waterproof coats		54	0·022
Stokers' gloves		53	0·012
Instruments and charts		50	0·012
Hosepipe		47	0·011
Rope, yarn, and canvas		45	0·010
Brushes and brooms		37	0·008
Coke-forks		35	0·008
Bells		37	0·008
Cartage		33	0·007
Waste and wipers		32	0·007
Wire rope		22	0·005
		3519	0·844

N.B.—In the above figures, the item of "chain repairs" is unduly heavy, owing to the faults mentioned later on. These have now been remedied, with the result that this figure will be much reduced in future. The remaining figures are, generally speaking, normal.

LUBRICATING OILS.

Many gas-works are even now, in these days of severe competition, using expensive oils which are in no way superior to good oils obtainable at low prices. For many years the writer has been in the habit of buying cylinder oil, gas-engine oil, and spindle oil at 9d. or 10d. per gallon, without noticing any signs whatever either of increased wear and tear or extra consumption of oil. The fact is that some years ago very large profits were being made by those who supplied lubricating oils; and it must in no case be assumed that because a high price is paid for an oil it is therefore a high-class article. It is probable that the same oil could be purchased at a large reduction from another firm. The writer, indeed, has good reason to believe that the oils at the prices named above are in every way as good as other oils sold for 2s. per gallon. The policy of making six-monthly or yearly contracts for items like lubricating oils is an inducement to merchants to quote close prices; and, again, if drawn in six barrel quantities, the price can usually be further reduced.

The writer has found that both for gas-engine cylinders and for almost all lubricating purposes the oil known as "No. 1 Russian"

is particularly suitable. It is a pure mineral oil with many good qualities, and users cannot go wrong in adopting it. This oil is adapted for all but the highest speeds and the heaviest bearings, and is also excellent as a gas-engine oil. As mentioned above, it may be bought at from 9d. to 1s. per gallon. For exceptional uses, the writer employs an engine oil costing 1s. 3d. per gallon.

Lubricators.

All lubricators should be of the sight-feed type. The old worsted type of oil-cup should be abolished to make way for the infinitely more economical method, by which exact regulation may be attained. With worsted, it is very difficult to so adjust the strands that a correct feed may be obtained. As a result the engine attendant always makes a practice of fitting the worsted too loosely, for fear the oil might cease to flow. The consequence is a heavy consumption of oil, for which it is impossible to blame the attendant—rather should the method be condemned as being obsolete.

The best way of lubricating steam cylinders is undoubtedly to use some positive means whereby a small quantity of oil is forced into the cylinder at regular intervals—preferably regulated by the speed of the engine itself. With the old method, it is impossible to determine whether the oil is admitted continuously or intermittently. Every indication points to the fact that the oil is forced in in gushes, with the result that a large part of the oil is wasted, owing to its being at once expelled by the piston with the exhaust steam. On the other hand, in the case of the up-to-date method the slide-valve, piston, and cylinder are continuously lubricated by the admission of regular, though infinitesimal, quantities of oil at every few strokes of the engine.

The writer has been much impressed with one method, in which the oil is contained in a glass vessel, whence the oil drops through a sight-feed glass tube, to be pumped into the cylinder at regular and close intervals by small plungers driven eccentrically by a rod attached to some working portion of the engine. By using this form of lubricator it has been found possible to save a very large portion of the cylinder oil previously used, and has also resulted in the better working of engines to which it has been fitted. This type of lubricator is very reasonable in price, and soon pays for itself in working.

An excellent means of lubricating the cylinders of gas-engines is by installing a mechanically-worked apparatus, by means of which a mixture of graphite and oil is pumped in continuously. The effect is somewhat surprising, as the graphite imparts a sort of frictionless surface to the working parts of the cylinder, with excellent results. A saving in gas consumption of from 10 to 25 per cent. was promised; the apparatus being supplied on trial. It was found that there was actually a saving of about 12 per cent., and this was with an engine the working of which was previously very satisfactory.

The writer considers that an oil-filter is an essential part of an engine-room, together with pans for catching the drips of oil from all working parts. The engine attendants can then keep themselves well supplied with filtered oil, which is for all practical purposes as good as the original oil. The same oil is used over again, and it is a practice which has never been found to be in any way detrimental, but, on the contrary, is a distinctly economical means of making the oil go as far as possible.

Waste and Wipers.

The use of waste is to some extent unsatisfactory, for the reason that its life is a very limited one. It is an item which, unless closely watched, is likely to be a heavy one—many engine attendants will, if unchecked, use an enormous quantity. The writer has always objected to the use of waste; and some time ago he adopted cloth wipers in its place. These cloths have a network appearance, and are made of a woollen material. To use such cloths economically, it is essential to provide some means of renewal, as otherwise their use would be so expensive as to be prohibitive. The writer found that the firm who supplied them at a cost of 14s. per gross were also willing to clean and renew them when worn out, at a cost of 3s. 10d. per gross, including carriage both ways. This is a most advantageous arrangement, and is, of course, only rendered possible by the oil extracted from the cloths. By the adoption of this system, it should not be difficult to halve the expenditure on waste, as has been done in the case in question.

Special Steels.

The use of expensive steel for making certain retort-house tools has been the means of economizing in this direction. Each tool requires a different material, and it is well worth while giving the matter some attention. Some tools require to be used for hard work when hot; some have to stand much rubbing; some, again, have to withstand a good deal of bending—such, for instance, as an auger-rod. Certain sorts of stoking-machines have particular kinds of treatment, and especially is this the case with those portions which are projected into retorts. For instance, extra expenditure on suitable steel for augers, auger-rods, pokers, pusher-heads, charging-machine heads and rods, wearing-strips, plates for coke shoots, &c., is justified many times over. As an instance, the writer has found that the furnace-bars of a water-gas generator, when made of a suitable material, will last three seasons, only requiring to be straightened after each year. Many similar instances could be mentioned.

Crane-Chains.

The wear and tear of crane-chains has given the writer much trouble; and he considers that excessive wear is due to a variety of causes which may be summarized as follows:

1.—Faulty arrangement of chain wheels.
2.—The number of pulleys.
3.—The size of pulleys, especially on the jib-head, on the principle that the larger the diameter of the pulley the less the wear on the chain.
4.—The lubricant used and its application.
5.—The practice of swinging the chain and grab while being lowered.

1 to 3.—These points are matters of general engineering knowledge, but are nevertheless points which are sometimes overlooked by the designers of the crane. In any case, they are worth mentioning, as it is occasionally possible to improve largely the existing arrangements on cranes in use.

4.—The choice of a suitable lubricant is probably the chief factor in the direction of economy. When it is considered that the grease or oil is required to remain on and between the links for many hours on end, it will be seen that the lubricant must be waterproof, of a thick consistency, and tenacious; otherwise it will soon run off and leave the links dry. No lubricant should be used that will not remain on the chain throughout a hard day's work, after which it is a good plan to examine the chains, for then it is not difficult to form some definite opinion of the quality of the lubricant. A very suitable chain oil is obtainable at 1s. per gallon. By far the best method of applying the grease or oil is to immerse the chain in a tank filled with the lubricant, and then draw it out slowly, to allow the surplus oil to drain off. The oil should be so thick that the chain only slowly sinks to the bottom of the tank. With a suitable chain oil it will be found that no link will be dry for many hours after the crane has been at work. At the writer's works, it is the practice for each crane driver to examine the chain once or twice every week; and when going over the links with a bucket of oil beside him, it is a simple matter to dip any part of the chain into the bucket. In this way both the examination and lubrication of the chain are done at the same time.

5.—It is a matter of experience that where chains are swung so as to cover the greatest possible area, the wear and tear is heavier (sometimes much heavier) than where the chain is always lowered vertically. This is, however, in some cases essential if the work is to be done efficiently and without much expense for trimming. For instance, discharging a ship with large holds is much harder work for a chain than discharging barges.

As to repairs to chains, it is a usual practice, when there are distinct signs of wear, to take the chain off and send it to one of the firms who make a speciality of the work—to be annealed, examined, repaired (where necessary), and tested; a signed certificate of the test being returned with the chain. This policy may be a very expensive one, as if, for reasons of expediency, a 1-inch chain is used where a ⅞-inch one would be strong enough, the chain repairers will test the large chain on its merits as a 1-inch chain, and not on its working load; so that as soon as any wear is shown, they will replace it with new chain, though the part cut out would be amply strong enough for a great deal more work. In practice there is, therefore, a good deal to be said on the side of employing smaller chains, which allow only a moderate margin for wear, in preference to using large and expensive chains, which will most certainly be condemned by an inspector long before their useful life is finished. In one case in the writer's knowledge, the wear and tear on crane-chains amounted to as much as the crane drivers' wages when working the cranes. This was entirely due to the above-mentioned cause.

An alternative plan, where a good chainsmith is employed, is to examine and repair the chain where necessary, and then send it away to be annealed and tested. The regulations for hoisting and lowering chains must, of course, be absolutely complied with; but at the same time it is possible to do the work on strictly careful, but commonsense principles. There is no reason at all why the work should not be equally well done, and with perfect safety. The regulations, so far as they are concerned with works' use, read as follows:

Regulation for Docks, &c.

> Regulation 9.—All machinery and chains and other gear used in hoisting or lowering in connection with the processes shall have been tested, and shall be periodically examined. All such chains shall be effectually softened by annealing or firing when necessary, and all ½-inch or smaller chains in general use shall be so annealed or fired once in every six months.
>
> As regards chains, the safe loads indicated by the test, the date of the last annealing, and any other particulars prescribed by the Secretary of State, shall be entered in a register, which shall be kept on the premises, unless some other place has been approved in writing by the Chief Inspector.

By a unanimous vote, the Rochdale Town Council last Thursday decided to increase the salary of Mr. F. H. Brunt, the Water-Works Manager, by £75 per annum. It was explained by Alderman W. T. Heap that Mr. Brunt's salary would have been automatically increased by £25; but his services had given so much satisfaction that the recommendation for an additional £50 was unanimously agreed to. Supporting the Committee's action the Mayor (Alderman W. Cunliffe) said that when Mr. Brunt came to Rochdale they advertised for a manager; but they now found they had an engineer.

MIDLAND ASSOCIATION OF GAS ENGINEERS AND MANAGERS.

The Autumn Meeting of the Association was held on Thursday last at the Grand Hotel, Birmingham. The PRESIDENT (Mr. Adam Cooke, of Oldbury) occupied the chair. The attendance of members and visitors was a large one, in view of the discussion on Dr. Davidson's paper, read at the last meeting, on "The Carbonization of Coal in Horizontal and Vertical Retorts," together with his subsequent communications to the "JOURNAL." In the course of the proceedings, the President mentioned that they had present among the visitors Mr. A. C. Young, of Arbroath; and, on behalf of the members, he tendered to him a hearty welcome.

MINUTES CONFIRMED.

The HON. SECRETARY (Mr. Harold E. Copp) read the minutes of the annual general meeting held on Feb. 29 last, and of the excursion meeting to Oldbury.

Mr. S. O. STEPHENSON (Tipton) asked why the adjourned meeting was not held as arranged, for the discussion of Dr. Davidson's paper. He thought the paper one of the most discussable contributions to the proceedings of the Association; and he was looking forward to the adjourned meeting. By this time the paper was old, and many members must have forgotten precisely what were its contents. He thought it was a great pity the meeting was not held.

Mr. W. C. JONES (Brierley Hill) moved the confirmation of the minutes.

The motion was seconded, and duly carried.

The PRESIDENT, referring to Mr. Stephenson's remarks, said it was decided to have a special meeting for the discussion of the paper, subject to the coal strike. Unfortunately, they were right in the middle of the coal strike when the meeting was to be held. The Committee consulted Dr. Davidson, and found it was impossible to do anything further then. Thereupon, the matter was considered by the Committee; and it was decided that the paper should be brought forward at the autumn meeting.

EDUCATION OF GAS-FITTERS.

The HON. SECRETARY, referring to this subject, said the matter had been under the consideration of the Committee; and Mr. Bell had been asked to represent the Midland Association, and to support the proposal when considered by the Council of the Institution of Gas Engineers. This was agreed to by Mr. Bell.

Mr. T. GLOVER asked if the question would come up again. He should also like to inquire whether anything had been done as to Mr. Bell being on the Committee. He had not noticed his name in the list of members.

Mr. BELL: I am not on the Council of the Institution now; and I was going to ask Mr. Glover if he would take up the duties.

Mr. GLOVER said he thought it was the wish of the Association that Mr. Bell should be on the Committee; and he considered something should be done. He was not on the Council himself now; but he found himself elected on to the Committee for the education and certification of gas-fitters. He thought that if the Council of the Institution knew it was the wish of the Association that Mr. Bell should represent them, they would comply with their wishes.

The PRESIDENT: Mr. Copp will write to the Council of the Institution.

LETTERS OF REGRET.

Several letters of regret were received, among others from Mr. Charles Hunt, Mr. R. G. Shadbolt, Mr. H. W. Woodall, and Mr. John West.

OFFICERS FOR THE ENSUING YEAR.

The HON. SECRETARY announced that as no other nominations had been received, the following gentlemen were elected to hold office:

President.—Mr. W. S. Morland, of Gloucester.
Vice-President.—Mr. W. J. R. Baker, of Great Malvern.
Hon. Treasurer.—Mr. W. R. Cooper, of Banbury.
New Members of Committee.—Mr. George Helps, Mr. R. S. Hilton, Mr. J. R. Duff, and Mr. W. H. Adams.
Auditors.—Mr. F. J. Ward, and Mr. H. J. Woodfine.

The Hon. Secretary added that, there having been no other nominations, it was decided to nominate the following gentlemen members of the Committee: Mr. W. Langford, Mr. Vincent Hughes, Mr. A. Cooke, Mr. W. C. Jones, Mr. J. R. Heath, Mr. W. A. Sapey, Mr. W. G. S. Cranmer, Mr. J. M'Coll, and Mr. W. W. Townsend. These are in addition to the gentlemen mentioned above.

NEW SECRETARY.

The PRESIDENT remarked that Mr. Copp felt that he should cease to be the Secretary of the Association—not from any feeling regarding the work of the Association, but for private reasons. The Committee had therefore that afternoon invited Mr. Townsend, of Hereford, to accept the office; and he had kindly done so. They would have in him a good and enthusiastic Secretary; and he (the President) hoped the members would assist him all they could.

NEW MEMBER.

On the motion of Mr. W. J. R. BAKER, seconded by Mr. W. A. SAPEY, Mr. Sydney Foster, of Stourport, was elected a member.

THE STRATFORD-ON-AVON EXPLOSION.

The HON. SECRETARY read a letter from Mr. J. S. Cranmer, conveying his sincere thanks for the kind expression of sympathy from the Association in connection with the recent unfortunate explosion at his works.

DISCUSSION ON DR. DAVIDSON'S PAPER.

The discussion was then taken on Dr. Davidson's paper, on "The Carbonization of Coal in Horizontal and Vertical Retorts," as read at the spring meeting. A full report of it will be found in other columns of this issue.

At the close of the discussion,

The PRESIDENT said they could not allow Dr. Davidson to leave without tendering to him their hearty thanks for the excellent paper he had given to them. He hoped it would not be by a long way the last they would have from Dr. Davidson.

Mr. COPP said he had much pleasure in seconding the proposition. In doing so, he should like to say that when, in the discussion, he (Mr. Copp) said he should leave the room with a certain sense of disappointment, he meant in regard to the discussion, and not in respect of the excellent material Dr. Davidson had put before them in the paper, and the articles that had appeared from him in the "JOURNAL."

The motion was carried with applause.

Dr. DAVIDSON, in his acknowledgment, said he would have failed in his duty if he had not given the members what he thought would be of interest, and provide topic for discussion. He was conscious there were many errors in the paper—errors of which he was ashamed. But he wanted to say in explanation that he was no longer conducting tests on the test-plant; and he had therefore not been able to repeat some of the tests as he should have liked to have done. But he thought he could vouch for the general accuracy of the results, though no doubt the members would be able to pick holes here and there.

The PRESIDENT also expressed, on behalf of the members, the pleasure with which all of them had listened to the remarks of Dr. Colman and Dr. Lessing.

TO CONSIDER THE FORMATION OF A COMMERCIAL SECTION.

Mr. J. FERGUSON BELL (Derby), pursuant to notice, moved—"That a Committee be appointed to consider and report as to the advisability of forming a Commercial Section, to be affiliated with the British Commercial Gas Association." He said the passing of the resolution would not commit the Association to any definite policy. But he thought that, seeing all the District Associations had each at the present time a Commercial Section with the exception of the Midland Association, it was desirable they should now consider the matter, and see whether they could not in the Midlands have a Commercial Section, and one which, in his idea, should be affiliated not only to the Midland Association, but with the British Commercial Gas Association. They had two most excellent representatives in Mr. Berridge and Mr. Hilton. In a letter that he had had from Mr. Hilton, he mentioned that it was his intention to call the Midland members together for the discussion of policy and commercial questions. It seemed to him (Mr. Bell) it would be a good thing if they had an Association which could meet periodically, and at which they could freely express their opinions. Therefore he would propose that a Committee be formed; and he suggested that it should consist of Mr. Morland, Mr. Berridge, Mr. Hilton, Mr. Copp, Mr. Townsend, Mr. Pooley, and himself (Mr. Bell).

Mr. J. M'COLL seconded the motion, and it was unanimously carried.

This concluded the proceedings.

Society of British Gas Industries.—It has been already announced in the "JOURNAL" that the autumn general meeting of the Society will be held at the Trocadero on the 20th inst. According to the programme of arrangements issued by the Secretary (Mr. Arthur L. Griffith), the members will take tea, on the invitation of the Chairman of the Council (Mr. T. S. Clapham), and assemble at five o'clock for the transaction of business. This will be carried out under the presidency of Mr. Corbet Woodall, J.P., D.Sc., M.Inst.C.E., and will include a paper on "Recent Developments in the Manufacture of Refractory Goods from Fire-Clays," by Mr. G. H. Pearson-Perry (the Chairman of the Fire-Clay Section of the Society), which will be open to discussion. Other matters to be considered by the members are the National Gas Exhibition to be held next year, and a report on the subject of the British Commercial Gas Association and the Society's co-operation therein. At the close of the business, the autumn dinner will be held, to be followed by a musical entertainment.

COAL DISTILLATION TESTS WITH DESSAU AND HORIZONTAL RETORTS, AND STUDIES IN CARBONIZING.

Discussion at the Midland Association Meeting Last Thursday.

It will be remembered that, at the meeting of the Midland Association of Gas Engineers and Managers, at Birmingham, on Feb. 29 last, Dr. W. B. DAVIDSON, of Birmingham, read a paper on "Coal Distillation Tests with Dessau and Horizontal Retorts." The author's tests were not at the time complete; and this fact, with the further one that the points he raised required study before discussion, led to the debate being postponed. Following the paper, Dr. Davidson contributed to our columns a series of articles under the heading of "Studies in Carbonizing;" and these articles should be read in connection with the paper.* The discussion took place at the meeting last Thursday.

The PRESIDENT (Mr. A. Cooke, of Oldbury) said they had many gentlemen present who were willing and anxious to take part in the discussion. The members of the Association simply desired, so far as was possible, to hear the best from both sides. He would call upon Dr. Davidson, who would submit a further communication on carbonizing in horizontal and vertical retorts.

Dr. DAVIDSON said he did not think he had promised a further communication to the Association; and he had not written one, nor was he going at present to add appreciably to what he had already written. He thought it better for the members to have their say; and he believed they were going to make it very hot for him. That was another reason why he should reserve some little ammunition for a reply. He wished, however, to say that they must not think he had any personal bias in the matter of retort systems. He had quite an open mind; and he simply gave the facts he had collected, without fear or favour. He liked to be outspoken; perhaps he was too much outspoken at times. But he believed in getting at the truth; and this was best done by recording the results of practical experience, and by putting people on their mettle, and allowing them to reply, and say how they had got over this or that disadvantage in the different systems. He had been bold enough to give a kind of balance-sheet for horizontals and verticals; but he did not pretend that this was at all accurate. Of course, he had not tried to estimate (say) what the absence of smoke, flame, and danger represented in the continuous vertical systems, or what it was worth (say) to have a plant made in our own country under British patents, or things of that sort. He had simply stated broadly what he considered to be the carbonizing results and the financial aspect, without going too much into detail. The members must excuse him now if he did not give any more material. He had promised to write a paper on tar from the carbonizer's point of view, and also on free and fixed nitrogen. These, however, were subjects which had no direct effect on the comparison between horizontals and verticals. A great deal could be said on these subjects. He should like to ask the vertical retort people to explain why it was that they claimed a very much better or thinner tar, and yet had to take so many elaborate precautions to prevent pitching-up—such as pitch-pans, and double hydraulic mains.

Mr. J. FERGUSON BELL (Derby) remarked that those present would agree with him that there was such a galaxy of information in Dr. Davidson's paper on "Coal Distillation Tests with Dessau and Horizontal Retorts" that it was somewhat difficult to know where to commence, especially when the paper was taken in conjunction with the series of subsequent articles which had appeared in the Technical Press, under the title "Studies in Carbonizing," which formed a valuable supplement, being a record of experimental investigations, extending over months, and involving much time, with high technical skill, and the essential requisite of all research work—to see things as they really are, not as one wished them to be. He ventured to say that these investigations, which Dr. Davidson had been good enough to present to the industry in so concise and lucid a manner, would add to the author's already deservedly high reputation as a scientific searcher after truth. The paper and supplements were divided, as the members knew, into four sections: (1) Coal distillation tests with Dessau and horizontal retorts; (2) Distillation in horizontal and intermittent vertical retorts; (3) Investigations in candle power and calorific value and residual products; and a remarkable communication was (4) The production of water gas in vertical retorts. In the observations he (Mr. Bell) proposed to make upon this valuable and instructive communication, he would endeavour to confine himself to the paper read by Dr. Davidson at the meeting of the Association in March; his intention being to deal with the other three supplementary communications later, in greater detail than was possible at this meeting, so that the results set forth might receive the attention they merited. The author's opening pronouncement, "that in gas production by pure distillation—steaming being excluded—horizontal and inclined retorts still hold a considerable lead over vertical retorts, intermittent or continuous, the advantage being very marked on a candle-power basis, and quite appreciable on a calorific-value basis," he thought would have caused a flutter in the dovecotes and a shock to some enthusiastic advocates of verticals. But they preferred to "wait and see." He was not sure Dr. Davidson's conclusions were not too sweeping, as horizontals with good Northern coal were credited with 14,000 cubic feet per ton of 540 gross B.Th.U., and he credited Midland coal with 12,000 cubic feet of 18-candle power gas of 525 B.Th.U. net calorific value, both of which, according to his own experience, were distinctly on the high side. Dessau verticals were credited with 12,000 cubic feet, 15-candle power, 500 B.Th.U. net, whereas a three days' test carried out by him (Mr. Bell) with ordinary Midland coal, by the kind permission of Mr. Drury, at the Ayres Quay Gas-Works, Sunderland, gave 12,480 cubic feet of 15·63-candle power gas of 530 B.Th.U. net, without steaming. There was a limiting line in carbonizing temperatures for various coals which it was not advisable to exceed. It might be the author was not fortunate enough to strike this temperature in some of the tests he had made. However this might be, independent tests confirmed his opinion that the Dessau vertical retort system, so far as gas making was concerned, was at least equal to horizontals, and with steaming, superior. Perhaps, while on this question, it might be of interest to quote some published results of the two continuous vertical systems—he referred to the Woodall-Duckham and the Glover-West. With the Woodall-Duckham settings, taking the average of five tests, they had 12,450 cubic feet per ton, of 15½-candle power gas, and 519 B.Th.U. net. With the Glover-West, on an average of seventeen tests, they had 12,576 cubic feet per ton of 15½-candle power gas and 515 B.Th.U. net. It was, he thought, remarkable how near these tests coincided, especially when it was taken into account that they were results obtained at different works from various grades of coal. They appeared to indicate that the Dessau intermittent vertical system was at least equal to the continuous vertical systems, so far as gas production was concerned. He was, however, in agreement with the author when he said that the respective merits of different competing carbonizing plants—the horizontals, inclines, intermittent verticals, continuous verticals, and chamber ovens—should not be judged entirely on gas production. Dr. Davidson rightly observed that gas was the principal product; but bye-products, labour costs, wear and tear, and interest charges were all important factors to have taken into account in coming to any conclusion as to what system of carbonizing to adopt. Bye-products came first, as they yielded on the average 72 per cent. on the cost of coals, of which coke produced 42 per cent. His (Mr. Bell's) criticism of the Dessau vertical retort was that it was not equal to the modern horizontal retort as a coke producer. Having had no experience with the continuous systems, and as there were others present who had, no doubt they would give the meeting the benefit of their experience. He would therefore confine his attention mainly to horizontals and Dessau verticals. The fuel account for carbonizing in Dessau verticals was about 5 per cent. higher than with horizontals, which meant, depending on the value of the coke, an extra 3d. to 4½d. per ton of coal used. Further, the coke produced was much too hard and dense for general domestic use, with the result that there was difficulty in disposing of it. His idea was that they should make a soft rather than a hard coke, unless there was a trade demand for hard, or perhaps, in some places, a furnace coke. It seemed to him that the method of charging Dessau vertical retorts required to be modified. Some 9½ or 10 cwt. of coal was dropped into a 4-metre vertical retort in a few seconds. It was well known that a falling body from rest was subject to an accelerating force that generated a velocity of some 32 feet per second; so that, in falling 16 feet, the coal acquired this momentum, which would give an idea of the packing action. This packing of the coal, together with the super-incumbent weight of coal, resulted in a pressure of 6 inches, or thereabouts, on the bottom of the retort after charging; and this tightly-packed charge of coal, when subjected to heat in the process of carbonization, became a semi-fused mass, resulting in a dense, heavy coke, unsuitable for domestic and many trade purposes. With many classes of coal, the charge dropped in the retort 9 or 10 inches. He made these criticisms of the Dessau system in the hope that it might be improved and modified to suit the conditions that prevailed in this country. He admired the system which Dr. Bueb, with the assistance of Herr Körting and others, had, by great technical skill, and those careful investigations for which our German friends were deservedly noted, spent so much time in perfecting. But his opinion was that before the Dessau system came into general use in this country it would require to be radically altered and modified to suit our conditions. It was interesting to compare the composition of gas from Dessau verticals as given by Dr. Davidson with those given, by Dr. Colman, in his recent William Young Memorial Lecture (which would repay careful study by all interested in carbonizing) before the North British Association. [See table reproduced on p. 434]. The nitrogen figures seemed to show that a little air was being drawn-in in the case of the Dessau settings, though the carbon dioxide was somewhat lower with the Dessau retorts. Bearing in mind that these analyses were of gas made from various seams of coal, he thought the results were strikingly similar. Dr. Colman gave analyses of three samples of gas taken from Glover-

* See "JOURNAL" for March 5 (p. 664); March 26 (p. 880); April 9 (p. 99); and April 23 (p. 213).

	Dessau. (Davidson.)		Glover-West. (Colman.)
CO_2	2·4	..	3·2
C_nH_{2n+2}	2·8	..	2·3
O	0·5	..	*nil*
CO	10·3	..	11·9
CH_4	28·0	..	28·0
H	51·0	..	53·5
N	5·0	..	1·3
	100·0	..	100·2

West verticals. The first was taken from the centre of the coal in the retort; the second from the coke near the inside wall of the retort; and finally the mixed gases at the ascension-pipe. He (Mr. Bell) found, by calculation, the outlet gas was approximately five parts from the low temperature zone, and eight parts from the high temperature zone, which appeared to him to indicate that, on the average, five parts by volume only passed upwards, in the manner of Dr. Bueb's hypothesis, through the relatively cool core at the centre, and eight parts were subjected to high temperature carbonization by passing through the highly-heated coke and at the sides of the retorts. The carbon on the verticals appeared to confirm Dr. Colman's views, that in all vertical systems a large volume of the gas produced was subjected to a high temperature. Personally, he (Mr. Bell) thought the hypothesis Dr. Bueb and many others had been so assiduous in demonstrating, that the gas passed upwards through a relatively cool core, did not, fortunately for the Dessau and other vertical systems, actually occur, except to a limited extent; otherwise it meant carbonizing under low temperature conditions, with an excess of liquid products. Perhaps Dr. Davidson would give them his views on the point. Now with regard to horizontal retorts with full charges, these produced results, so far as gas making was concerned, very similar to those of Dessau verticals. In one case the long axis of the retort was horizontal; then it was inclined at about 32° to the horizontal; and now it was placed vertical. All these retorts were charged intermittently, and during the first few minutes drew upon the stored heat of the retort, which was speedily reduced from (say) 1100° C. about in the first hour to 700° C., and in two hours gradually increased again to 800° C., and then gradually upward. There was no doubt in his mind with filled charges in horizontal retorts, with a space of 3 or 4 inches left at the top, the gas came up through fissures in the coke, and then travelled along the space to the ascension-pipes. He found there was an increase of from 40 to 50 per cent. in the sulphur compounds in the gas produced from benches with single ascension-pipes as compared with gas produced in retorts with pipes at each end. This impurity was by far the most difficult one to deal with; and, in consequence of the large increase in sulphur compounds due to single ascension-pipes, he advocated pipes on each side of the bench. He mentioned this as it appeared to him a most important point to remember in respect to horizontal retorts. He would like to refer to some tests he (Mr. Bell) had made at Sunderland with Dessau vertical retorts working Midland coal, as these did not agree in respect to the production of sulphur compounds with the figures given by Dr. Davidson. In the first place, he found there was practically the same amount of sulphur compounds in the crude gas as with filled-up horizontals, depending, of course, upon the quantity of sulphur in the coal. Further, he did not find, as was expected, an increase in the production of ammonia; but he was not very confident upon this point, as there was some difficulty in accurately measuring the liquor produced. However this might be, he found upon reference to "Field's Analysis" that last year at Derby they obtained for ammonia 2·97d. per 1000 cubic feet of gas sold, which was the highest return given. The ammonia, of course, depended upon the nitrogen present in the coal. He mentioned this simply in confirmation of his opinion, so far as proved up to the present, that filled-up horizontals were as good as verticals for the production of this important product. With regard to tar, there was no doubt that from intermittent and continuous verticals there was a larger quantity; and it was lighter, which indicated that a certain proportion of the gas was produced by low temperature carbonization. It would be better if less tar were produced with a larger quantity of permanent gas. The production of light tars might or might not be an advantage financially. It, of course, depended upon the value of the tar products; and latterly the price of pitch had to a large extent ruled the price of tar, so those people who were making heavy tars were receiving financially the best result. The capital expenditure for verticals was greater than for horizontals with machinery, which appeared to him a serious objection. He did not think works fitted up with modern horizontals and machinery need fear comparison in respect to working results, taking everything into account, although no doubt the vertical system did possess certain advantages—notably less smoke and dust, absence of stoking machinery with its liability to breakdown, and increased make of gas on the same ground space. He, however, looked forward to the perfecting of both intermittent and continuous vertical systems, and cordially wished they might, upon a more extended experience, prove that they fulfilled the most sanguine hopes. Any system that tended to ameliorate the conditions of retort-house labour should command careful investigation; and he desired to again express his cordial thanks to Dr. Davidson, to Mr. Hilton, and to the Birmingham Gas Committee for freely placing at their disposal the results of so careful an experimental investigation and trials extending over a considerable period. He ventured to hope the members might have placed before them the results obtained from the installation of Woodall-Duckham continuous vertical retorts, as Birmingham would shortly have a large installation on this system, and, in addition, the results obtained from chamber-ovens. He thought the latter was the first in this country to produce at the gas-works hard coke for metallurgical purposes, although there were several installations of chamber ovens in successful operation on the Continent.

Dr. Harold G. Colman (London) said their hearty congratulations and thanks were due to Dr. Davidson for the very valuable series of observations on carbonization which he had brought before the Association—congratulations, in the first place, on the opportunity he had had in the command of the Birmingham large-scale testing plant, and, in the second place, on the great use he had made of his opportunity. Their thanks were due to him for the notable contribution he had made to the inner knowledge of carbonization by these investigations, and also to the Birmingham Corporation Gas Department for having permitted their publication. Dr. Davidson had given very fully the details of the results obtained in the numerous tests, so that all might be able to study them, and draw their own conclusions; and at the same time he had given many of the conclusions to which he had himself been led by them. With many of these, the members would doubtless all agree. But in a complex matter of this kind, Dr. Davidson would not expect to find full agreement in all respects, nor, probably, would he agree with many of the conclusions likely to be expressed in the discussion. A detailed examination of the wealth of experimental material was, of course, impossible in the time available that afternoon; but there were one or two points in connection with it that he (Dr. Colman) would like to mention. In tabulating the results, Dr. Davidson had reduced all the yields and composition of the gases to a constant figure of 1 per cent. of nitrogen, representing the amount actually derived from the coal itself, and eliminating that due to the nitrogen drawn in from the waste gases around the retorts, or from the air—thus permitting of a more ready comparison of the results of the various tests. At the same time, it must not be concluded that the elimination of this excess of nitrogen over 1 per cent. meant that all the gas shown after such deduction had been obtained from the original coal, for with the nitrogen drawn in from the waste gases was also drawn in roughly one-fourth of its volume of carbonic acid and one-eighth of its volume of steam. These were more or less converted into carbonic oxide and hydrogen by the action of the red-hot coke in the retort; thus appreciably increasing the yield of combustible gases per ton, and somewhat upsetting the comparison, where variable amounts of overpulling had taken place, even when the excess of nitrogen was deducted by calculation. While he agreed with Dr. Davidson when he said that the special addition of steam was not "distillation," it was equally true that this additional quantity of combustible gas derived from the waste gases was not a product of distillation, and the extra quantity of combustible could only be obtained in this way accompanied with much nitrogen, which last could not, in fact, be removed. On the other hand, while the additional production of water gas by the special introduction of steam into the retort was not "distilling," it must be remembered that much water gas production went on in all cases in the retort by the action of the steam actually formed from the coal itself on the red-hot coke; and if a carbonizing system effected the conversion of a greater proportion of such steam into water gas (as was, he believed, the case with all systems of vertical retorts), this additional amount of combustible gas was truly a product of the distillation of the coal. There was an additional method of stating the results that seemed to him to be very valuable—as well as giving the yield of gas per ton of coal, and its percentage composition—viz., to calculate from these figures the actual number of cubic feet per ton made of each constituent; these figures being readily obtained by multiplying the make per ton by the percentage amount of carbon dioxide, heavy hydrocarbons, carbonic oxide, &c., and dividing by 100. Recalculated in this manner, not only did the difficulty as to drawn-in nitrogen largely disappear, but a number of other interesting relations became manifest, which were only obscurely indicated in the ordinary method of expressing the results. He (Dr. Colman) had, however, not yet by any means completed the recalculation of the great mass of figures in this manner; and it would be premature therefore to consider the results now. One of Dr. Davidson's main conclusions was that while carbonization in vertical retorts presented a very great number of advantages, which he set forth, such retorts, when steaming was not carried out, did not give such high gas results, both as to illuminating power multiple and calorific power multiple—*i.e.*, yield of B.Th.U. per ton—as could be obtained from the same coal in horizontal retorts under the best conditions; and though the results he gave of the coals tested in the Birmingham plant accorded with his view, he (Dr. Colman) was not able to agree with this as a general proposition, so far as the calorific power multiple was concerned, though he believed it to be true as regarded the generally much less important illuminating power multiple, especially where the gas was required to be of relatively high illuminating power. In the case of horizontal retorts with small charges, from which Dr. Davidson obtained the best gas results, there was undoubtedly a more complete conversion of the tar into gas, which increased the quantity of unsaturated hydrocarbons in the resulting gas; and inasmuch as the illuminating power mainly depended on the amount of these constituents, this largely helped the results from the illuminating power point of view, though of much less proportionate influence in regard to the calorific power of the gas. On the other hand, in all forms of

vertical retort, quite apart from any extra addition of steam, the proportion of steam formed from the decomposition of the coal which was converted into water gas was decidedly greater than in horizontal retorts; and this, so far as calorific power multiple was concerned, tended to compensate for the loss of unsaturated hydrocarbons. In Dr. Davidson's tests, this extra production of water gas, which was readily evident when the results were calculated in cubic feet of each constituent per ton, was insufficient to balance the loss of B.Th.U. from the decreased production of unsaturated hydrocarbons and methane. He here left out of account all the numerous indirect disadvantages arising from the over-cracking of the tar vapours, to which Dr. Davidson fully referred in his paper. On the other hand, although he (Dr. Colman) had not had the opportunity of making direct comparison of the same coals in horizontal and vertical retorts, the figures obtained from his own tests in vertical retorts of various systems had led him to the conclusion that with many coals the additional production of water gas without steaming more than counterbalanced the loss in hydrocarbons, and that a bigger yield of B.Th.U. per ton was obtained, though the calorific power of the gas per cubic foot was lower than in the gas obtained from the same coal in horizontal retorts, unless there was considerable overpulling, but that even then the gas had a calorific power of usually about 550 B.Th.U. gross, and an illuminating power of not less than 14 candles tested with the No. 2 burner. On the whole, therefore, he did not think that the figures given could be taken as the best that could be obtained in the vertical retorts with coals in general, or even with Derbyshire coal in particular, although he believed that the latter coals, containing, as they did, a large percentage of oxygen, showed a less proportionate advantage in vertical retorts than did the more slowly carbonizing coals containing a lower percentage of oxygen. Dr. Davidson had had long experience with the working of his experimental bench of horizontal retorts, and, with increased knowledge of the most suitable conditions for the carbonization of Derbyshire coals in these retorts, had, he (Dr. Colman) thought, year by year been able to get better results from the same coal. He could not help thinking that, with further experience with the vertical retorts, he would obtain better results from the Derbyshire coals than hitherto. He (Dr. Colman) had not made any tests with Derbyshire coals in intermittent vertical retorts; but he might perhaps give, as a reason for his faith, the results of a test made with a Derbyshire coal of somewhat the same character in continuous vertical retorts at St. Helens. This coal contained, as carbonized, the unusually high amount of 6·4 per cent. of moisture, which was not favourable to good results, but gave almost exactly 12,000 cubic feet per ton, corrected to 1 per cent. of nitrogen, with a net calorific power of 490 B.Th.U. or a yield of 5,880,000 B.Th.U. per ton. Dr. Davidson's test of certainly a different sample of Derbyshire coal gave 10,400 cubic feet per ton calculated to 1 per cent. of nitrogen, with a net calorific power of 555 B.Th.U., or a yield of 5,782,000 B.Th.U., per ton. Calculating the yields of each constituent of the gas per ton in each case, the yield of methane was practically the same in each case; but the increased yield of carbonic oxide and hydrogen more than balanced the loss in unsaturated hydrocarbons.

Dr. Davidson (intervening) said he should like to say at this stage that the results published in his recent paper were not supposed to give the value of the coal in actual working. In actual working, one got much higher values. These experiments were made specially on a Sunday; and the coal had to be distilled right out. It was impossible in working to keep the retort-house governor level to get the best out of the coal. All the figures were ridiculously low; and the tests were only of qualitative, and not of quantitative, value. The comparison was not therefore valid. Instead of 10,400 cubic feet, they got something like 12,400 cubic feet from the coal in actual working.

Dr. Colman (continuing) said he might also mention that, in these particular tests, the yields of tar and ammonia were very high, and the coke produced was distinctly superior to that obtained from the same coal in horizontal retorts. In this case, while some steam was added, the amount was very small, though doubtless the high percentage of moisture in the coal helped the production of water gas. But this was much more than compensated for by the fact that the coal only contained 93·6 per cent. of dry coal, instead of the usual 97 or 98 per cent. While it would be rash to say that the best results of which they were capable had even yet been obtained from horizontal retorts, and whereas also there were, as he had said elsewhere, certain manifest points in which still better results might be obtained with vertical retorts, it did seem to him most probable that, with the further adoption of vertical retorts, whether intermittent or continuous, the experience gained in daily working under varying conditions, which could only be gathered slowly, would lead to further considerable improvement in gas results, without losing the advantages which these retorts had in so many respects. One other point, with regard to the question of steaming, he had expressed his agreement with Dr. Davidson that "steaming is not distilling," and that, in studying the results obtained with these retorts, it was necessary for comparison to distinguish between the gases produced by true distillation from those produced by steaming. But he (Dr. Colman) did not mean to infer that there was in itself any objection to steaming, if it resulted in the economic production of the quality of gas desired. If it was a question of making a gas of the quality now most largely supplied—say, of 14-candle power and 550 B.Th.U. gross, and if this could only be made either by dilution with nitrogen by overpulling, or by steaming and diluting with water gas, his preference would unhesitatingly be for dilution with the combustible water gas, and it was one very material advantage of vertical retorts over horizontal retorts that they did permit of the ready, and in many cases at any rate, economical production of water gas in this manner. One other point he should like to add with regard to Mr. Bell's remarks. He referred to the analysis that he (Dr. Colman) made of the gas from different points of the charge in the continuous vertical retorts, and inferred from this that five-thirteenths of the gas went through the cool part of the charge, and eight-thirteenths went upwards through the hot coke. He (Dr. Colman) could not agree that the figures he gave were sufficient to enable any such calculation to be made. He only took a sample of gas from one point in the centre and from one point at the outside of the charge; and this did not allow an average calculation to be made. He could not therefore say what the average point was in a continuous vertical retort. To get at this they would have to make a far larger number of tests than he had made. These tests were carried out to show that qualitatively there was a difference at these points.

Dr. R. Lessing (London) said the keynote of the discussion appeared to him to be the limitations of large-scale tests. The result of the many discussions on carbonization they had had before this one at various times and places, and what they had heard from Mr. Bell and Dr. Colman so far, brought home to them the truth that it was exceedingly difficult, if at all possible, to compare like with like in tests of this kind. They must always, in taking certain results, make it clear to themselves that they were comparing a particular plant, worked with a particular operation, which plant was possibly, and most likely, not built with that amount of perfection that everyone of the competiting contractors would like to see a fact in his own erection. He did not think that anyone of those who were competing in the erection of carbonizing plant that day would flatter himself that he had achieved, in every one of his plants, the ideal that he had before him, or believed that he had reached finality. This applied to the plant, and to the dead body with which they had to work. Then came the difficulty to which Dr. Colman had alluded—that the worker himself was not able always to operate the plant to the best advantage. This might again be due to various causes. A worker might not be accustomed to a new type of plant so well as he was with another type; he might have had more experience with the one than the other. He had also the difficulty of material with which to contend. Possibly, too, very slight alterations in the plant or its working—perhaps in one point only—would effect an improvement, and make the particular plant compare more favourably with another, or *vice versâ*. Therefore, he said, it was exceedingly difficult to accept results—more especially quantitative results—as final when comparing them. Now Dr. Davidson had told them himself that he should not like to have his results regarded as quantitative, but rather as qualitative, as showing what kind of products could be made, what factors were governing the carbonization in either system or in any one of several systems, and that they by no means represented the multiplicity of results that could be obtained from a more perfect system, and from the most favourable working, and so on. It almost seemed as if they were always moving in a *circulus vitiosus*. When they advanced criticism against one particular point, in regard to the plant of one maker, that maker would be ready with the retort (in a metaphorical sense) that it would be very easy to regulate this, and that only in this particular case had he been unfortunate for one reason or another. They had heard from Mr. Bell that he would like to see the Dessau retort produce coke of less density; and he (Dr. Lessing) had no doubt the well-known skill of the Dessau people would enable them to overcome the difficulty in this direction, if the majority of the users of the system would like them to. Someone else might make it a particular point of his criticism that the coke was not dense enough and was too friable. So in his (Dr. Lessing's) opinion, it would be more profitable, in discussions of this kind, to consider the ideal principle underlying each construction, and then decide whether the one or the other system was the better. The members must not think he was there trying to belittle the work they were present to discuss, because he believed that work of this kind was much needed. Dr. Davidson had put the qualification upon his own work—that they must look at it from the qualitative way, and must always bear in mind that alterations in one or the other way must influence the results, as long as they were fully aware in what directions the alterations would work. But he (Dr. Lessing) did not think anyone would that day deny the fact that they knew a good deal more about what was going on inside a retort than they did (say) five years ago, and this without the tedious or questionable process of projecting themselves inside the retort, as suggested once by Mr. Newbigging. On the whole, he thought that, in order to get to underlying principles, this was not altogether the right procedure. When the practical gas manager had to decide on an increase of plant, he had to determine the system as quickly as possible, one way or the other. They were present that day rather to further the possibility of obtaining the results they desired; and therefore he thought the principles would have to stand out more than the actual results at various places. What he would like to do that day was to put in a plea for testing from individual points; and this came practically to the same thing as testing on the small scale. He should like to have every point picked out from this very intricate problem of carbonization, and

to devote attention to it. There, again, they were faced with the difficulty that they could not do this with regard to a process in its entirety. Now he held the view that a good deal could be done in this direction by restricting the volume with which they had to deal—the mass with which they had to deal—to such a small quantity as to enable them to practically take in all the factors that were governing it—to control all the conditions, and thereby learn in detail possibly more than practical working would tell them with regard to these carbonizing factors. Some present would remember that he put this view forward at the last annual meeting of the Institution of Gas Engineers; and the method he then brought before the members was capable of comparing these factors to a very considerable degree. Now the fact that he did not think any the less of the large-scale testing than of the small-scale testing might be brought out by the fact that he actually took Dr. Davidson's large-scale tests as the standard in obtaining results on the small scale. Dr. Davidson at the time supplied him with an average sample of the coal he had been using throughout these tests; and he (Dr. Lessing) regarded Dr. Davidson's results as so important, and so carefully compiled, that he thought the coal would form a very suitable standard in trying to establish a relation between the small quantities with which he was dealing and the large quantities that had to be dealt with on the practical scale. The possibilities that were offered by small-scale testing might be shown by the fact that the enormous amount of labour, time, and energy that had been spent on this investigation by Dr. Davidson and his staff had, after all, only been concerned with one particular kind of coal. Another coal of a slightly different character, and certainly a coal of an entirely different character, might upset all the quantitative results that were before them as being the results to be obtained with the coal in the various carbonizing systems. It was impossible on the large scale, on account of the mass involved, and the lack of elasticity in that respect, to do coal-testing in that sense. On the other hand, if they did want to get nearer the end, it was a vital problem for them to compare all the coals that had to be dealt with in various works, and see what kind would be suited to one system of carbonization, and what to another; or else it might be the tendency of those who had to erect carbonizing plants to provide a system that would act as a compromise in doing good work for all classes of coal. It seemed that all the considerations could only be found if they actually studied the carbonization of coal under many different conditions, and from many points of view. On the small scale, one was able to vary the conditions to such an extent that, within a day, one might get out a good number of factors which had their limitations applied to the large scale, and which must be very fruitful. He thought a good deal in this direction had been so far neglected. It was almost impossible to compare the systems, and especially to improve them, without knowing exactly what was in reality wanted. In carbonization, there were some of the demands and some of the requirements in the plants which compensated each other; but, at the same time, it was difficult to make both ends meet. They wanted to allow the heat to go through the retorts as rapidly as possible; while the walls should be of slow conductivity for the heat, and should be suitable to hold the structure, and allow for going up and down during the charging and discharging. They wanted to let the heat rise to a hot temperature so as to decompose the coal substance into the chemical compounds which formed the gas, and a gas containing the right amount of the necessary constituents. At the same time, they did not want to heat the retorts and the primarily formed compounds high enough to allow the formation of naphthalene and sulphur compounds, and to crack-up the tar that was formed at first to such an extent as to make a very thick and possibly less valuable tar, although they were told by Mr. Bell that at the present time a thick tar had more value in the markets. But the tendency was to produce a thin tar. The question then was to find a compromise in cracking-up the coal substance itself sufficiently, without cracking-up the secondary products to realize a higher gas make. Then came the question of drawing in flue gases; and the production of water gas from the coal or after carbonization, of course, complicated the consideration of tests of this kind to a great extent. If they could exclude such things altogether, at least over a test, it must show exactly what they had there on the large scale, and they might be able to provide for it. He thought the plan for frequent testing, and for elasticity of testing on the small scale, at least was a valuable adjunct to testing on the large scale, and a most valuable proceeding for the advance of gas making, and especially of retort-setting construction.

Mr. Samuel Glover (St. Helens) remarked that, when he realized that this meeting was called primarily for the discussion of Dr. Davidson's paper, it appeared to him that it would be a difficult matter to discuss fully, and in an interesting way, a paper which had been presented so long ago. And, on looking up the matter which had been contributed by Dr. Davidson in the first place, and which had been added to from time to time, he found that it did not seem quite so controversial as it at first appeared. This, he thought Dr. Davidson would allow him to explain, might have been partly from the way in which the paper was delivered to them. They knew the circumstances under which it was prepared in a hurry and brought before them; and they were thankful to Dr. Davidson for bringing it under such circumstances, as they would much rather have had it under those conditions than not at all. But he submitted that the Midland Association, as well as any other Association, was better doing its work if a subject of this sort was submitted in a way by which the members were informed to some extent upon the subject, and knew that the paper would be discussed on the day it was brought before them. If his experiences were of any value to the conductors of the Midland Association, he hoped they would be taken to heart. When they came there the day the paper was read, they were desirous of doing Dr. Davidson full justice, and giving the paper the consideration that they felt sure it deserved. Some of them then had a very anxious time of it; but immediately the paper was over, the President announced it was not to be discussed that day. It was no doubt a great relief to some of them who wanted to add to the interest of the day. But they began to wonder whether it could be discussed properly on that day; and they were glad it was put back. Now one had to remind oneself of the nature of the matter before one could discuss it. However, though, in his original paper, Dr. Davidson seemed to condemn vertical retorts he was doing so only on a short experience, and he knew, and would be the first to admit, that those were not legitimate results with vertical retorts. But then he submitted that in respect of wages, tar, liquor, sulphur compounds, and naphthalene, verticals gave remarkably good results over horizontals and inclines; and he went on to say that, with better results in gas, the vertical systems would on their merits completely oust their rivals. They had had some of their leading spirits that afternoon expressing themselves—and it was the proper view both for their friends and for gas engineers—that the last word had not been said about what could be done by vertical retorts. He thought they were particularly referring to the continuous system, as there had been suggestions for modifications of the intermittent system, at which their German friends had been working so assiduously and extensively for many years. If there had been one point that had been quoted in favour of carbonizing coals in intermittent retorts, it had been the quality of the coke; and it was desirable that it should be understood that the system made coke of a certain quality, and so the system was less valuable when that quality of coke was not required than when that quality of coke was required. They looked forward to a modification of the system which would enhance it in the way it had been looked at that day as requiring benefiting. They had chemists who were looking into the question of carbonization; and in Dr. Davidson they hoped they were going to have one of those rare products of the chemical engineering world, a chemist-engineer—a sphere of labour which was often looked down upon with very great vigour by some chemists. It was not admitted by certain chemists of high technical ability who had been trained in chemistry and not in manufacture, that there was such a thing as a chemical engineer. But he (Mr. Glover) did hope, with great trust and confidence, that in Dr. Davidson, in his new sphere (in which they wished him every success and great happiness), they were going to have a chemist who had become an engineer, and who would ultimately make a chemical engineer who would be able to look at all subjects of gas engineering with a skilled and trained mind and large experience. With all the confidence they had in chemists, it had been proved time and again that the chemist could produce in his laboratory things which the engineer who had to do the work on the large scale, and had to face a balance-sheet—not an imaginary balance-sheet, but a balance-sheet which had to stand the criticism of auditors at the end of a year or half year—could not do. A gas engineer had to produce a balance-sheet of this sort; and he had to have a very large and clear outlook of the whole operations. The arguments they had had from their helpful friends, the chemists, that afternoon pointed to the need of a flexible process—a process which lent itself to all the various duties that a gas engineer had to perform. A gas engineer was one who had to produce gas for a living, and for the convenience of mankind generally. They required a process that was flexible, and also, as Dr. Colman had said, not only a flexible system, but one that was entirely under control. If they did not give a works manager a system of this sort, then he was faced with difficulties all the time. A gas-works manager was one who needed, if possible, his labour conditions improved, and not made worse than they had been in the past. He thought they would live to see the former days not better than these. A definite question had been asked by Dr. Davidson of those who had experience of vertical retorts, as to why the tar was claimed to be different from that produced from horizontal retorts. Dr. Davidson knew that the claim was justifiable, because he was aware the tar was different. It was not for them to stay there to discuss whether a tar was better which had plenty of pitch in it because the market happened now to be in a certain position; but it was a matter of fact that the vertical retort tar was different—was more liquid. He thought Dr. Davidson knew this, but wanted someone connected with vertical retorts to put it from their point of view. It was because, with the vertical retort, the radiant heat was not there breaking-up or breaking-down the hydrocarbons as they were produced from the coal. The tar was not decomposed in the way it usually was in horizontal retorts, having radiant space in uncontrollable bulk; and therefore there was not so much free carbon in the tar; and therefore it was, as a fact, of as great value as, or greater value than, the tar from horizontal retorts, which, unfortunately for many who had still to deal with horizontal retorts, was too often loaded with carbon. The question had to be looked at from all points of view; and they had to take all the products into account. He was prepared to assert, from a long experience—possibly he could claim a longer experience than any member of the Midland Association

with continuous vertical retorts—that all that was in the coal (and as Dr. Lessing had said they had to work with all sorts of coal with the continuous system) could be got out, and its full value realized, in gaseous and liquid products and solid coke. Gas was their first consideration, because they were first gas producers. But coke was important; and in the continuous vertical system, the quality of the coke was improved—it was not so dense as it was in the intermittent system. The tar, as he had said, was improved in quality; and all the other products were improved in quality, and the valuable products were improved or increased in quantity. There was not so much waste, or decomposition taking place, as the process could be controlled with the continuous system. This gave more power of control than any other system of carbonization yet developed; and the labour conditions, as they all knew, were much improved. He had now had upwards of four years' uninterrupted experience with continuous vertical retorts—the settings at St. Helens, which many of their friends had visited, were still working—so he was now in a position to answer some of the questions that he had not been able to answer earlier in the history of continuous carbonization. One was as to how the retorts were likely to last, and how they were likely to behave under continuous operation. He had to inform them that the old retort-settings at St. Helens were still at work. When last examined, the interior of the retorts was in such alignment that several practical gas engineers who visited the works while they were off the last time for pointing were as astonished as he himself was with the alignment. They were almost in the same condition as they were when put in, except that there was a crack here and there—the retorts having had to adjust themselves to the expansion of the setting. This was a gratifying fact. They did not make any assertions until they felt they could stand by them; and he mentioned this fact to-day with great pleasure. The problem had been very thoroughly solved; and now they had the assurance that they had a flexible and controllable system which could be put into the hands of gas engineers for the solving of the very interesting questions which they had had under such careful consideration. In addition to his own testimony, he had fresh evidence from two gas engineers of considerable position and standing in the gas industry. One wrote that it would interest him to know that the average yield of gas per ton this year had been 13,038 cubic feet, corrected for standard temperature and pressure, with a calorific value of 550 B.Th.U. gross and an illuminating power of 15 candles with the No. 2 burner. "Of course," continued the letter, "if one of our chemists sits on the plant we can get very much higher results than these; but what is wanted is carbonizing plant that, with a minimum of attention, will produce regular and satisfactory results throughout the year. The composition of the gas has been most regular; the average nitrogen content being 3 to 4 per cent., and the highest recorded was 6·2 per cent." Another gas engineer wrote to say that since the plant was started, and gas sent through to the holders, it had been working continuously and in a satisfactory manner. "It is found that we can make any grade of gas we desire as easily as we can do with the carburetted water gas and coal gas plant, with the result that we have a more flexible method of carbonization than with either horizontals or inclines. We are getting about 12,800 cubic feet per ton, of an illuminating power of 17 candles, and a calorific value of from 500 to 525 B.Th.U. net. The exact make per ton cannot be finally determined as yet, but the figure given is on the low side. The recording calorimeter shows practically a straight line on the meter outlet; and after a few minor adjustments, the plant will work practically automatically. The coke is much larger, and a bit harder than the coke obtained from similar coal carbonized in our horizontal or inclined systems at the same works; and it is preferred by our consumers." These were a few facts to assure the members that they had solved many of the problems that had to be looked at on the large scale. They could obtain results now all round which were better than from any other process of carbonization, with all their British and foreign coals, that had been submitted for testing purposes.

Mr. A. M. Duckham (London) said this was intended to be a discussion on Dr. Davidson's paper, and not upon carbonization generally. He had read the paper with a great deal of interest; and he had learned a lot from it. Dr. Davidson had asked one question, and his friend Mr. Glover partially answered it; but he would like to hear the complete answer. Dr. Davidson asked if, with continuously working vertical retorts, they made a thin tar, how was it that in all systems of vertical retort working heavy deposits had been known to occur in the hydraulic mains or connections to the retorts? Mr. Glover had said—and Dr. Davidson would agree—that the bulk of tar from vertical retorts of all descriptions was a light tar. But there were deposits in the hydraulic mains. He (Mr. Duckham) could only speak of the system with which he was connected; and he would be glad to hear Dr. Davidson give his reason for the other systems. It would also be interesting if Mr. Glover could give the reason for the system to which he had referred. What he (Mr. Duckham) had found was that it one was working a coal into a vertical retort continuously—a coal which contained a large proportion of dust—that dust was carried off from the top of the charge. As the charge went into the retort, the gas was passing through the charge, and the dust was carried forward and deposited in the nearest place—either in the hydraulic main or in the foul main; and the tar or sticky mass combined with the coal dust would stick, and when cold it would break exactly like pitch. If working with nuts, or coal containing a considerable percentage of moisture, these deposits of dust were not obtained but only the thin tar. Dealing with another question, Dr. Colman had raised a point as to making water gas from the moisture in the coal in vertical retorts. He could not agree with Dr. Colman. He (Mr. Duckham) found that if coal was damp going into a retort, the steam (as Dr. Colman clearly showed in his Young Memorial Lecture) came up the centre of the charge. He quite agreed with Dr. Colman that, when gas making actually commenced, the gas went outwards, and up the side of the retort. But the steam that was driven off by the action of the outside walls of the retort went inwards, and up the centre of the charge, because there was a free space in it. He did not think there was any appreciable amount of water gas made in the continuous vertical retort from the moisture in the coal. Mr. Glover had spoken of having had some considerable experience of continuously working vertical retorts. He was a younger man than Mr. Glover; but he could confess to some nine years' experience. It might interest the members, and perhaps bear a little on the question, if he told them how he came to go into the matter. His partner (Mr. Harold Woodall) and himself were thinking and talking over these things at Bournemouth; and it seemed to them that horizontal charging was a crude form of carbonization. They had a retort, and a certain amount of coal was put into it and left for a certain time. Whatever the quality of the coal (it varied from time to time) the same amount was put into the retort, and it was left in for the same time. Every gas engineer knew there were certain coals that wanted to be more baked, while other coals required to be less baked. They wished to overcome this difficulty; and they started the idea of continuous carbonization. At first they thought that if they could build a retort in which it was possible to regulate the time the coal was in it, it would be a very good thing indeed—it would be a flexible system. A retort was built; and then the trouble was how to heat the retort, and this they had to learn. They did it in several ways, and got various interesting results. Then they settled that it was better to heat it at the top, and lessen the heat at the bottom; and they were still of opinion that this was the best way of doing it. Then they found they were not getting the full value in the products coming away; they were not then making the same good results obtained with horizontal retorts. They had more tar and ammonia; but they were not satisfied with the amount of gas obtained. They found they got a great deal of light oils, and paraffins and that sort of thing, on the top of the tar. They came to the conclusion (which he was glad to see some of their friends had come to) that it would be a good thing to provide some means of dealing with the light tars. In order to do this, they made the experiment of putting a partition at the head of the retort to allow a free space through which the gas had to pass. When Mr. Thomas Glover read his valuable paper some years ago with regard to radiant heat, he (Mr. Duckham) was more interested than anyone in the question. He was quite sure they did want radiant heat on the gases—more especially in a vertical retort, because in a vertical retort they did not get the breaking-down action of the free spaces which they had in horizontal retorts. They put this free space in; and then it occurred to them that it would be quite simple to regulate the extent of it. They made arrangements to do so. They thought, in that way, the engineer could work continuously. He could vary his speeds, and vary the temperature to which the gases were subjected on leaving the retorts, and so the engineer could get the best results from his plant. Dr. Davidson would very shortly have another plant on which he could make experiments; and he (Mr. Duckham) hoped that he would be able to get out further figures with regard to continuously working carbonizing plants, and that he would be present to hear them.

Mr. Samuel Glover said he wished to make it quite clear that his experience over the last four years had been with one setting, and the same setting, of vertical retorts, and his claim was that he was a man who had had the longest experience of a continuously working vertical retort, which had been working for upwards of four years. With regard to the composition of the pitch in the hydraulic mains, he did not think it consisted largely of carbonized material; he did not think the theory of uncarbonized dust carried forward would bear investigation.

Dr. Colman asked to be allowed a word of explanation. So far as the moisture driven off from the coal was concerned—the free moisture present—he agreed that it went to the centre of the coal. The steam he was referring to was the steam formed by the decomposition of the coal substance at high temperatures, which did not go through the coal, but formed water gas.

Mr. Thomas Glover (Norwich) said that since the time he wrote the paper Mr. Duckham had referred to, he was afraid he had not been able to do anything further. He was still extremely interested in the subject of carbonization; but he was quite prepared to leave the development of vertical retorts in the able hands of those who were dealing with the matter. By and by, no doubt, they would have some valuable testimony from those who were actually using them; and they would then enjoy the discussion perhaps even more than they were doing that day. With regard to the question of the quality of tar, they got practically the same quality in horizontal retorts that were filled up and worked over long periods. They realized a larger volume of tar, as well as a tar which had a smaller percentage of pitch, was free from naphthalene, and had a low free-carbon content. Altogether, the tars were very different from the old high-temperature small-charge tars. He wanted to point out that the volume of tar was larger;

and the value of the tar per gallon or per ton was just as good as it was in the old days. He was a tar distiller; and he could say that Mr. Bell had made a mistake in assuming that because the tar had not the old percentage of pitch in it, it was less valuable, because if the present price of creosote per ton was worked out (the creosote taking the place of pitch), it would be found that the two things were just about equal. To-day, the price of pitch was about 50s. per ton, and creosote was also about equal to 50s.; so that if they were making creosote instead of pitch, they were getting equivalent results. There was a much greater quantity of creosote in a twelve-hour heavy-charge tar; and, presumably, in tar from vertical retorts, the creosote took the place of the larger pitch content. There was the question of the quality of the tar, which Dr. Davidson had referred to, from the verticals. He (Mr. Glover) would venture to make a suggestion with regard to this matter, although he was not sure that it was the right one. Was it not possible that, in vertical retorts, the gases leaving the upper part of the charge were driven off at a low temperature, and contained an amount of paraffins? If they tried the experiment of mixing some paraffin oils with tar, a "mucky" mess was the result. This was impressed upon him in his old laboratory days, when he was experimenting with the manufacture of oil gas, when he found that the presence of paraffins made with coal tar a sticky mess. He thought it was possible that some paraffins from the top of the vertical charge escaped decomposition; they mixed with the oils that had undergone greater decomposition, and precipitation of carbon took place. This rather pointed to the necessity of treating the gases from the upper part of the charge with some amount of radiant heat, as was pointed out in the paper to which Mr. Duckham had referred. But whether treated with radiant heat or not, the important point was what could verticals be made to give in total money value in products? He believed it might be demonstrated that they would give rather better total financial results than the best horizontal practice. He thought, however, it might be possible that those who were working horizontal retorts in the best way were approximating very closely to the best results that were being obtained from verticals. This was comforting for those who put in horizontal benches some years ago. When his works were being remodelled in 1903-4, the best plant that he knew of at the time was installed; and they got most excellent results. The retorts were making, in ordinary circumstances, something over 12,000 cubic feet of gas per ton of coal; and the results in coke and other products were very gratifying. Those who had horizontals must not feel downcast, or envy those who had had the privilege of putting in verticals, but must wait for the day that was coming. When one saw the excellent results that were being obtained—and they had the comforting pleasure of seeing settings that had given, perhaps, 2000 days' life—one could put up with a horizontal system, especially when the coke was in such excellent condition, and the other products were all right. When one found, in a vertical setting, things going on very quietly, and there was little to be seen, that, he supposed, was an advantage. But as an old carbonizer, he liked to see the coke coming out of the retorts beautifully glowing. And when one looked from an elevated point on to a retort-house in full work, and saw the clouds of smoke and dust, or when one had to stand for an hour or two in a modern retort-house and get smothered in fine particles of dust, one then thought there was a fine chance for the vertical systems.

Mr. George Helps (Nuneaton) said, so far, the time had been occupied with a highly scientific discussion; and, therefore, he should like, if the members would bear with him for a few moments, to try to get down to the "A.B.C." of the subject. The question was, What were their consumers or customers going to get, and what were they to pay for it? Dr. Davidson in his paper stated the result from a ton of coal as 15,000 cubic feet of gas of 500 B.Th.U. That was a pretty high result. They were not all getting that—at any rate, he was not. Dr. Davidson might tell them if he knew of any works where such a result was obtained, because he (Mr. Helps) would like his results to be up to them. Another point which required explanation was as to the various advantages derived from bye-products. In the paper, Dr. Davidson said that the vertical retort had, in respect of tar, an advantage of 40 per cent. over the horizontal retort with one ascension-pipe. He did not think any speaker had given any information as to why in vertical carbonization such an advantage as this could be obtained over horizontal carbonization. Following on that, Dr. Davidson also said: "Taking gas at 10d. per 1000 cubic feet, *plus* profit." Four out of five of the members were unable to sell gas at a profit at that price. Dr. Davidson's argument only held good where the profit per 1000 cubic feet was 1d. or 1½d., and not 1s. or 1s. 6d., as it was in the majority of cases. With regard to vertical retorts against horizontals, it seemed to him what they had heard that afternoon conveyed the impression that it was "six of one and half-a-dozen of the other." The members were there to get down to the broad issues, and not to discuss points relating to a per cent. or two; and that was what he thought some of the speakers had done to an unnecessary extent. He was interested to know what was the best gas in calorific value that they could produce for their customers. He asked this question because he thought it pointed the direction for useful work by some of those gentlemen who were able to carry on such investigation. He would like them to say how it was that with a gas of perhaps 550 B.Th.U. they could get about 20 candles or a little over per cubic foot from a mantle; while with a gas of 450 B.Th.U., 18 or 18½ candles could be obtained? The difference of 22 per cent. due to the higher calorific power was not at all proportionate. This was a very important point in discussing the question of horizontals *versus* verticals. If the point could be settled in their own minds, he had no doubt from what he had heard that afternoon from the scientific gentlemen present that the vertical retort would score. The reason he gave for this conclusion was that the vertical retort would allow them to use steam, which the horizontal retort did not enable them to do. If it were found that with a gas of 400 or 450 B.Th.U. they could give their customers a better duty than they could by making a higher quality gas, then they must have the vertical retort and steam, and make water gas.

Mr. W. W. Townsend (Hereford) said some of the points on which he had made notes had already been dealt with to some extent by the previous speakers; but perhaps he might be allowed to give his views on certain of the side-issues raised by this excellent paper. In the first place, he noted that, in the third section of the paper, in comparing the results from the coal-test plant, with a modern horizontal installation, the author said: "With the large-scale plant, tar and liquor are reduced about 20 per cent., the gas contains more naphthalene and 40 per cent. more sulphur, and a large amount of cyanogen. The temperatures are about the same; but there is one essential difference, in that there is only one ascension-pipe to each retort in the large installation." From this, it appeared that those of them who used stop-ended retorts set back to back, with, of course, ascension-pipes both sides, were practising better carbonization than the heavy charging enthusiasts, whether they used one pipe or two, because the disadvantage of two pipes on a through retort was well known. Secondly, it seemed to him that Dr. Davidson had rather laboured the comparison between the gas given by verticals and by horizontals with overpulling. If 15-candle gas be desired, then verticals would produce it in a scientific manner. But to obtain it from horizontals by the simple process of adulteration was certainly not scientific; and it was quite as easy to add blue water gas from a separate plant to horizontal retort gas as to vertical retort gas. Taking the author's own figures, the yield with normal working (with horizontals) of 11,400 cubic feet of gas of 525 net calorific value could be diluted to 12,900 cubic feet of mixed coal and water gas (all combustible) of 500 B.Th.U. net, by the addition of 1500 cubic feet of water gas costing 8·4d., as compared with 12,400 cubic feet of 500 B.Th.U. net with overpulling. Further, the calorific value of the gas was not, as was well known, the only point to be considered; a mixed coal and water gas of 500 B.Th.U. would give a higher flame temperature than a 500 B.Th.U. gas made by what he had called adulteration. With reference to the author's comparison of the cost of making water gas in a separate plant, and by steaming the charge in the vertical retort, he (Mr. Townsend) noticed that, in his figures, he allowed for an addition of water gas amounting to about 12½ per cent.; and this was apparently the limit, because, even with a good coal, the resulting gas was only 15·2-candle power. Those works, therefore, which desired to use 20 per cent. and upwards of water gas would have to make carburetted water gas rather than adopt steaming of the charge. Where it was only desired to add a small percentage of blue water gas, steaming the charge certainly seemed, on the face of it, the more economical method, because one would hardly contemplate the erection of separate plant, involving extra attendance, &c., to produce 10 per cent. of water gas, which, in a works making a million cubic feet per day (maximum), would amount to 100,000 cubic feet of water gas per day in winter, and only about 40,000 cubic feet per day in summer. It was doubtful whether a small quantity like this could be produced in a separate plant at the price given by the author—viz., 5·6d. per 1000 cubic feet. His (Mr. Townsend's) object was to show that, in a medium-sized works, the advantage of steaming the charge would be greater than the author's figures.

Mr. H. E. Copp (West Bromwich) observed that he came to the meeting in the hope of being able to form a more definite idea as to the correct method of carbonization. In this he was afraid he would go away disappointed—in fact, he thought the difficulties one had in a matter of this kind had only been added to. There were one or two points, however, which stood out as a result of the discussion, and of Dr. Davidson's paper. The author definitely said, speaking of horizontals, that over-pulling did not pay. He (Mr. Copp) thought this was an important conclusion; because he ventured to think that a great many of the high makes which were seen recorded from horizontal retorts, without any mention of illuminating power (or if it was mentioned there was careful avoidance of any statement showing with which burner it had been tested), were due, in some measure, to over-pulling. Now, as had been pointed out, over-pulling was a poor way of getting an increased volume of gas, because one simply got inert gases. Experience told him that these inert gases reduced flame temperature in greater degree than they did illuminating or calorific power. It was important that they should look to flame temperature, because the relation between calorific power and flame temperature broke down when dealing with inert gases. Consequently, gas made in this way, by means of stretching the gas, gave the consumer poor value for his money. He did not see himself, nor had he heard any reason why, steam should not be introduced in limited quantities in continuous vertical retorts; but he had certainly heard objections as to the dryness of the coke produced by continuous vertical retorts. It was supposed to be an advantage that there was little dust and smoke about; but from what he had seen of vertical retorts, the smoke and dust of the coke were distinct objections. Dr. Davidson had given them a table in which

he showed the illuminating power of the gas made in horizontal retorts at different periods of the charge. Now the illuminating power and the rate of production apparently coincided, or very nearly so. He thought the speed of the evolution of the gas from the horizontal retort must be a very haphazard affair altogether—in fact, it was almost beyond control in horizontals. This showed very clearly that the whole principle of horizontal carbonization was wrong, from the scientific point of view. That was the conclusion he was led to; and it seemed to him that what they had to work for could only be obtained by means of vertical retorts in which the superheating of the gas was absolutely under control. He had brought with him a small sample of coke picked up in his retort-house that morning. He did not think he had ever seen a better sample of coke from vertical retorts than this one from a horizontal retort.

Mr. JOHN WEST (Manchester) sent the following contribution to the discussion: The admirable and instructive comparative experiments made by Dr. Davidson between the horizontal and intermittent vertical retorts, and the results he has obtained, give scope for an excellent discussion on very many important points. But the fact that he draws a comparison with the working of the continuous system of vertical retorts compels me to make a few remarks. It appears that the Doctor admits the well-known advantages in connection with vertical retorts as to wages, tar and liquor, sulphur, and naphthalene; and that these give them a remarkably good start over horizontals, and that, with better results for gas, the vertical retorts on their merits completely oust their rivals. I wish to point out to Dr. Davidson and my brother engineers that the only doubtful points he appears to have in his mind are the illuminating power and the calorific value. How he can have become imbued with such an idea, I cannot understand? And I feel sure that, when he has had some experience in working a continuous plant, he will be fully convinced that these important items are entirely satisfactory. I particularly wish to deal with this question, and to point out that, after our many experimental trials and all the improvements were completed at St. Helens, the make per ton, the illuminating power, and the calorific value were most satisfactory. A very large number of practical experiments have been made at St. Helens; and before making a test for any particular company or corporation, we have obtained from the engineer the practical results he was getting from his coal with horizontal retorts, and, when the same kind of coal is tested in the verticals, we have in all cases obtained more units of light than has been previously obtained in horizontals, and in some cases the increase has been very considerable. Everybody now using the system is very pleased with the advantages derived from it, especially upon this head; and the results given in Mr. Newbigging's paper read before the Institution of Gas Engineers fully showed the great advantages of the vertical system. Dr. Davidson remarks that: "On summing up the respective balance-sheets, very little difference may be found between the two competitive systems." In this respect, I may say that, with the Glover-West system, we have already some very tangible proofs of advantages shown in the balance-sheets that have been issued since its adoption. First, at St. Helens, where a small installation was erected, they increased their profits, and reduced the price of gas to the consumers. Then at Manchester I quite recently learned from Mr. J. G. Newbigging, the Chief Engineer, in connection with his vertical retorts, which have now been in operation for more than two years, the average yield per ton this year had been 13,038 cubic feet, with a calorific value of 550 B.Th.U. gross, and an illuminating power of 15 candles using the No. 2 burner. Then at Rochdale [see "JOURNAL" for April 30, 1912] you will find that the extra profits for residuals, coke, and wages, during the year were very considerable—viz., £4122 for residuals, £1065 for wages, and £3300 for coke. The vertical plant in this case had only been working six months. To what extent the increase for residuals and coke is due to the vertical retorts, I cannot say; but the saving in labour is said to be entirely due to them. At Helensburgh, where the whole of the gas was made with continuous verticals, the increased profits were very considerable; and as in Scotland all the profits from improvements go to the reduction in the price of gas, the Corporation have been enabled to reduce the price in this case from 2s. 11d. to 2s. 6d., or 5d. per 1000 cubic feet. Therefore, I venture to submit we are beginning to prove that there is something tangible in the continuous system. There is one very important point that has not, in my opinion, received the consideration it demands. I refer to the well-known fact that some coals liberate their gases much more freely than others. Hence some coals require to remain longer in the retorts, and others less, to bring about complete carbonization. Although, as you know, I have had considerable experience with carbonizing coals, I must admit that I was not fully aware of the great difference existing in this respect until I began to make experiments upon the continuous system; and then I found that nearly every kind of coal required different treatment, and in some cases the differences were very extreme. But with the method of heating and the system of regulating the speed of the coal through the retorts by a slight alteration of the driving gear, we have absolute and complete control over the whole plant, and can vary the quality and the volume of the gas at will. Dr. Davidson and many other gas engineers have for some time past been experimenting and exercising their minds endeavouring to find out whether large or small charges are satisfactory, what was the best duration of the charge, and the advantages of admitting steam and extraneous gases to increase the volume and give them the illuminating power required. But with either horizontals, inclines, intermittent verticals, or coke-ovens, you meet with the endless difficulty of being restricted to hard-and-fast lines of definite times for charging and dividing the charges into periods of 24 hours. After a determination is made, the same weight is put in and taken out at the end of the definite period, irrespective of the peculiarities of the coal under carbonization; and thus sometimes the coal is over-cooked and at other times under-cooked. In the latter case, a large percentage of volatile matter was left in the coke; hence considerable loss. All the trouble and anxiety as to periods and durations of charges and the addition of steam and extraneous gases are dispensed with when continuous carbonization is adopted, as the great control over the plant enables one to get any desired volume of gas or illuminating power or calorific value.

Mr. VINCENT HUGHES (Smethwick) said he had had no intention of speaking; and his only reason for doing so was just to correct the wrong impression that might get abroad from the remarks of their friend, Mr. Helps. Mr. Helps he believed stated that he thought that there were about six of one and half-a-dozen of the other so far as horizontal and vertical retorts were concerned. Mr. Helps was quite "off the line" in that. If it would assist him and any of his friends, he (Mr. Hughes) would like to say that there was really no comparison between working ordinary horizontal or inclined retorts and vertical settings. Up to within twelve months ago, he had both horizontals and inclines at work; and he would give a few plain figures. The previous year his make per ton was about 12,200 cubic feet—using a mixture of Yorkshire, Derbyshire, and two or three other sorts of coal. The year before was not quite so good; but the general results had been a little bit superior to Nuneaton. At the present time they had no difficulty whatever with the Woodall-Duckham continuous vertical retorts in getting anywhere between 12,500 and 13,000 cubic feet to the ton. In both cases the calorific value was practically the same. The calorific value was 560 or 570 B.Th.U. gross; and they maintained this figure. It was tested three or four times a day, so there was no doubt about the point. By the Woodall-Duckham system (he supposed the same remark would apply to the Glover-West) it was quite easy to get at least 500 cubic feet to the ton more than by either horizontals or inclines. Of course, the make varied according to the quality of the coal. The coke was better in appearance and much cleaner. The tar was beautifully thin; and they had no trouble whatever with stopped ascension pipes. He had not had a stopped pipe for something like three months. The liquor was, he believed, more; but he could not speak definitely as to this point in their working.

Mr. HELPS remarked that he only spoke of six of one and half-a-dozen of the other up to a point. When he referred to steaming, he said he plumped for verticals.

The PRESIDENT said they had had a discussion on the paper which would be read by almost everyone in the gas industry all over the world. He was sure all had listened to the discussion with the greatest pleasure. Dr. Davidson would now stand up and face what had been said by the various speakers; and he was sure he would hold his own.

Dr. Davidson's Reply to the Discussion.

Dr. DAVIDSON, replying to the discussion, said he must at the outset express the feeling he had that the members had rather magnified the importance of his paper. In coming to the conclusions that he had arrived at in regard to the gas-making efficiencies of horizontals and verticals, he did so not at all by these tests. They had nothing whatever to do with it. Certain results were found. It was observed that the gas made from horizontals was better than that produced by verticals; and they asked themselves the reason why. Then these tests were carried out in a qualitative way—not with the idea of getting a multiple or a criterion of the value of a particular coal in horizontals or verticals, but simply to show the course of the distillation, and to try to account for the differences in the analytical composition of the gas, as well as the illuminating power and calorific value. That was the reason why he objected to Dr. Colman's comparison, because the totals of the gas made per ton were very low. Those present would well understand the reason. The coal was dumped into the retorts as quickly as possible—only a few tons. In the first stages of carbonization, this was more than the exhauster could deal with, because the gas was coming off at a high rate; and although they did their best to keep a level gauge, they were not successful, and not very successful towards the end of the distillation, when little gas was coming off. It was difficult to regulate gas making in this way, although it was quite a different thing when tests were being made in the ordinary manner, or when one was distilling, not a matter of a few tons, but 60 tons or 100 tons, or doing a mixed test. Then one got results that were reliable and comparable, and agreed to, perhaps, within 1 or 2 per cent. Answering Mr. Bell's remarks, he claimed to make 14,000 cubic feet per ton, but not of 540 B.Th.U. net, but 500 net—that was a multiple of 7 million B.Th.U. per ton. This had been exceeded recently with the best Yorkshire coal on the horizontal plant. The Sunderland test figures for Grassmere coal were, to him, splendid. They were better than he had ever realized with Dessau retorts. He had not been able to equal the results; and he could only speak of their own experience at Birmingham. They were most careful. He did not wish to throw any doubts on the tests; but he desired to say that in Birmingham the calorific value in particular was tested daily with calorimeters. A calo-

rimeter was apt to get out of order; and it was checked daily with a duplicate, so as to keep it within the limit of the smallest possible error. The error in determining the calorific value would not be more than ½ per cent.; but he had found calorimeters to vary as much as 6 per cent.—sometimes up and sometimes down—without any apparent reason. The coke from Dessau retorts was greatly objected to by Mr. Bell. He (Dr. Davidson) thought the Gas Department could readily sell Dessau coke in Birmingham; but he was sure it would not be so acceptable for house fires as ordinary or continuous vertical coke. He had used tons and tons of different cokes at his own house, where he did not burn anything else but coke. He had used Derbyshire, Yorkshire, and North Staffordshire coke, and coke from verticals, as well as Durham coke. Durham coke was the worst they could possibly have for house fires. They sized their coke very carefully through a 1¼-inch over a 1-inch screen. It was very necessary to have the coke of proper size, in order to get it to burn in the open fire. He did not think there would be much difficulty in getting ordinary Derbyshire coke made in Dessau retorts to burn, though it would not be so acceptable as the other. With regard to the gas analysis that Mr. Bell produced, there was a large difference of carbon dioxide.

Dr. COLMAN said the analysis was of gas taken from the retort itself, and drawn direct through special pipes, so that none of the carbon dioxide was taken out. The same gas after the scrubbers gave 2·2 per cent.

Dr. DAVIDSON said he found moisture in the coal had a powerful effect on the carbon dioxide. It would be noticed from the figures that, when they wetted the coal with 12½ per cent. of water they got 50 per cent. carbon dioxide, showing that the water in the coal did take part in the water-gas reaction. He always found with Yorkshire coals that they had less carbon dioxide than with Derbyshire coals. This was due to the fact that Derbyshire coals were invariably more moist. Some frequently contained 7 per cent. of water. As to the formation of retort carbon, in the best gas-works in Birmingham there was twenty times as much carbon made as in the inclined retorts. Of course, one did not make very much carbon in inclined retorts in this country, owing to the cutting action of the draught. But the amount of carbon made in these retorts with their make per ton was remarkable; but it had the advantage of keeping the retorts tight. The gas multiple was the highest that had ever been reached in spite of the increased carbon. Mr. Bell had made some remarks about tar and gas; and he (Dr. Davidson) would like to remind those speakers who had referred to high makes per ton that they had not mentioned the loss of tar. Mr. Settle showed him, the other day, some figures he got with the Settle-Padfield system, with makes of 14,000 cubic feet per ton and no tar. Compare this with 12,000 cubic feet per ton and the usual quantity of tar—say, 12 gallons. With gas at only 10d. per 1000 cubic feet, there was a gain in gas on Mr. Settle's figures of 20d.; and a loss in tar, at 2½d. per gallon, of 30d.—a net loss of 10d. per ton of coal. It was not, to his mind, advisable to crack the tar; the more tar the better. It paid better to have the tar than the gas. They had tried putting the tar in again and cracking it; and they had signally failed. He did not think anybody had done it with success. He was not speaking of low-temperature work, such as in the coalite process; he was speaking of ordinary temperature work with different systems, and the system that produced the most tar was, he thought, the most profitable. There was too much made of gas yield per ton. It was a great pity, because one was induced to over-pull to increase the make. He would not go so far as to say that over-pulling did not pay. He had modified his opinion a little about this. It did pay to a certain extent, because one undoubtedly gained in heat units—perhaps 2 per cent. or so. They saved the loss of gas going into the settings. If one multiplied the make per ton by the calorific value, it was found that they did better with over-pulling than without it; but they lost in illuminating power. But as the calorific power was the more important, there was an excuse for over-pulling. Dr. Colman pointed out that it was a good plan to total-up the combustible gases. He had not done anything with regard to this lately. He (Dr. Davidson) had that in view at one time; but he had not done anything with it lately. He used to think that with vertical retorts better relative results were secured with richer coals than with poor coals. Recent tests, however, had scarcely confirmed this. The advantage seemed to be, if anything, very slight, so far as their tests had gone. Coming to Dr. Lessing's remarks on large-scale tests *versus* small-scale tests, he was quite of opinion that small-scale tests were of no use in valuing a coal; but he thought they would be of great value in settling little points—why (for example) the marsh gas was reduced in vertical retorts. Then they could eliminate the oxygen or nitrogen and the carbon dioxide from the furnace gas. They could do this in a bottle-tight tube—such as a quartz tube; and it would be a useful means of research. In regard to carbon dioxide, if the coke made from any of the systems was carbonized—that was, heated in a quartz tube—they got gas containing carbon monoxide. It was difficult to say how much carbon monoxide came from the steam, and how much was due to the coke. Dr. Lessing seemed to think that they had been testing with one coal all the time. He had made numerous tests, but these had no bearing at all on the efficiencies of the different plants. They were only qualitative, to show the course of distillation, and to help to elucidate the many problems of carbonization. He was much obliged to Mr. Duckham and to Mr. Thomas Glover for their remarks on tar. The members knew that in the Dessau system pitch-pans were regularly used. Under each dip-pipe there was a pitch-pan, which had to be changed frequently to get the dirt or pitch away. His opinion was there was a good deal of dust carried over, and it collected with the tar. In their little installation they did not wish to use pitch-pans. They objected to the method, and wanted to keep all the tar together. They struggled along in this way for some time; but they had much trouble with the tar-main and the tar-tower, and had to shut down the plant to deal with the tar-tower, which was very much exposed. Since then the tar-tower had been done away with, and they did not resort to pitch-pans. They simply put in a stirring arrangement in the hydraulic main, to keep the tar mixed; and this proved quite successful. Then they were able to sell all the pitch with the tar, as he believed the Dessau people would like to do. He had noticed a tremendous amount of pitch in going over their works. Although the tar from the Dessau vertical retorts contained only 2 or 3 per cent. of carbon, unless it was watched in this way, it would be sure to give trouble. One of the reasons undoubtedly was that in all vertical retorts the take-off pipes were very short, and there was no baffling action on the gas; and thus the dust was mechanically carried over and deposited in the hydraulic main with the tar, collected in a heap, and caused blockage. By increasing the length of pipe, or putting in a sort of condensing scrubber, the difficulty could be got rid of in a better way than by using pitch-pans. In those cases in which good—one might say splendid—results were obtained in gas making, nothing was said about the tar. Splendid results were obtained in horizontal retorts, Fiddes-Aldridge charged, with one ascension-pipe. As he had said in his paper, instead of getting 13 gallons of tar, as from verticals, they got only 9 gallons; and the gain in the gas did not seem to make up for the loss in tar. Gas was continually going down in price. It was made cheaper and cheaper into the holder, and the profit was cut down. Tar, on the other hand, was keeping up in price, so the relative positions were against dropping the make of tar. Mr. Duckham observed that steam came up the centre of the retort. They had noticed this quite clearly with the Dessau retorts. Soon after putting in the charge, the gas from the centre of the charge did not even light up; it was nearly all steam. But this was not quite what Dr. Colman referred to. In a thick charge, there was always a certain amount of water left, and it did increase the volume of gas towards the end of the period of distillation, forming carbon dioxide as well. That was what happened in coke-ovens with wetted coal. It was most certainly an ideal system to be able to regulate the rate of distillation, as could be done with continuous vertical retorts. It could be done much less with intermittent verticals or horizontals. But on a large works, was this possible? He did not think it was. The coal came in in one shift with a multiple of 180, and in the next one with 190. How could they make an alteration in such a short time? Theoretically, if they were taking one coal, or perhaps two or three coals of the same quality, it was possible to regulate the rate with advantage. But on a large works where they had seven or eight different coals coming in at various rates day by day, they would have to fix the speed at a favourable average. One would be fixed just as much in the rate of distillation as one would be with intermittent retorts. In smaller works, or where only one or two coals were used, there would, no doubt, be an advantage. The idea of the paraffins rendering the tar thicker was a very good one; and he was much obliged for the suggestion. Mr. Helps did not think it was possible to get 15,000 cubic feet per ton of 550 B.Th.U. gross. This could only be done with the very best Yorkshire coal under the best conditions, and that would be a multiple of 7,500,000 B.Th.U. He thought that the value of 10d. was not far out. He did not know the gas-works where they got 100 per cent. profit—making gas at 1s. and selling it at 2s. He took it that the gas was made into the holder at (say) 6d., 7d., or 8d., per 1000 cubic feet, and the costs of distribution and other charges were probably about the same amount. The profit was therefore perhaps only 2d. That was why he selected 10d. With regard to the point as to what was the best gas, he had, with Mr. Helps, an idea that vertical retort gas would prove very much better in incandescent burners, because there was less nitrogen and less carbon dioxide. It required less air, and one expected, and, he thought, obtained, a higher flame temperature. The figures of actual tests were as follows: Vertical retort gas of 528 B.Th.U. net, compared with gas made in horizontals and inclines at 527. The illuminating power in the No. 2 burner was 15·75 and 17·35 candles respectively. The tests were made with an ordinary "C" burner at 28-10ths pressure. The efficiency per cubic foot was 21·3 for the vertical gas, and 21·1 for the horizontals and inclines—thus showing very little difference. In another case the calorific value was 508 B.Th.U. for verticals and 510 B.Th.U. for inclines, and the efficiencies at 29-10ths pressure were 20·8 and 20·5 candles—a gain of about 1 or 1½ per cent. by the verticals for the same calorific value.

Dr. COLMAN inquired the percentage of nitrogen in the two cases.

Dr. DAVIDSON said it was 4·5 for the verticals and 7·9 for the horizontals and inclines. In the other case, it was 7·5 for verticals and 12·9 for inclines. Mr. Copp thought the principle of carbonization in horizontal retorts was wrong. He (Dr. Davidson) agreed that the uniformity of the gas obtained with continuous vertical retorts was a great desideratum—it was a very important thing. But the question was, when one added up the whole thing and made out the balance-sheet, which paid the best? The ideal system might not be the most profitable and practicable.

MANCHESTER JUNIOR GAS ASSOCIATION.

Visit to Stockport Gas-Works.

Between sixty and seventy members of the Manchester and District Junior Gas Association availed themselves of the opportunity afforded last Saturday of visiting and inspecting the gas-works of the Stockport Corporation. On their arrival, early in the afternoon, at the works in Great Portwood Street, the party were cordially welcomed by Alderman James Fernley, J.P., Chairman of the Gas Committee, who expressed his pleasure at seeing so large a gathering of those engaged in the gas industry, and said he hoped they might find, in the course of their inspection of the works, something of interest, and something by which they would benefit. He announced that if in the future members of the Association desired to look over the works individually or collectively, he would be pleased to see them. Divided into four groups, the party then proceeded to inspect the works under the direction of Mr. S. Meunier, the Gas Engineer and Manager, Mr. W. S. Sowerbutts, the Assistant-Engineer, Mr. J. Alsop, the Hon. Secretary of the Association, and Mr. Bowden. Special atention was paid by the visitors to the inclined retorts, the coal and coke handling plants, the telpher, the reinforced concrete tank, and the two-lift column-guided holder in course of conversion into a four-lift cable-guided one—the third lift now being in course of erection.

History of the Gas Undertaking.

Mr. Alsop, who is a member of the staff at the Portwood works, gave some interesting particulars as to the history of the gas undertaking from its earliest days. He said it was in 1820 that a gas company was formed, with a capital of £10,000, to erect gas-works to supply Stockport. But Mr. Thomas Claye, who took up the secretaryship of the Company, had five years previously lighted up his own premises with gas. The plant was of most primitive description; the retort being a 6-inch pipe placed behind his kitchen fire, the gasholder pit containing a tin vessel upside down, and the condenser being a 2-inch pipe coiled round the pit. The gas was purified by being passed through lime water. Mr. Claye's fittings were equally simple. He had placed in his shop window a perforated cruet, with a burner for a stopper, to which the gas was conveyed. Frequently crowds assembled round the window to see this, to them, "wonderful light," for it looked as if the flame proceeded from an empty bottle. The Company established their works in Millgate, and they were planned by Mr. Grafton. The Company carried on the undertaking from 1821 to 1825 without legal protection; but in the latter year they obtained an Act of Parliament. It is of interest to note, in passing, that the first main was only a 4-inch one, which supplied the Market Place and its surroundings. In 1826, application was made to Parliament on behalf of the inhabitants of Stockport for an Act for lighting, cleansing, and improving the streets and other places within the town; also for regulating the police. This measure included clauses empowering the Police Commissioners to establish gas-works. The Directors of the Gas Company opposed the application; and this led to a compromise by which favourable terms were granted to the Commissioners, when the clauses relating to the gas-works were withdrawn. Up to 1825, the only mode of lighting the streets was by a few oil-lamps; but in the year named, four public lamps were put up in the Underbank, and one in Bridge Street, to be lighted from Sept. 20 to March 20, with the exception of five nights at the full moon—the charge being at the rate of £3 per lamp. Before the passing of the Reform Bill, Stockport consisted of the township alone, and the legal operations of the Gas and Police Acts were confined to the township. The Stockport Gas Company, however, proceeded to supply the neighbouring township of Heaton Norris, which brought about opposition; a Mr. Henry Booth putting up works and selling gas at a cheaper rate. Subsequently the gas-works at Heaton Norris passed into the hands of Mr. Thomas Robinson for £3000, subject to a chief rent; and the price of gas was raised to the same level as in Stockport. There were then no meters; the prices charged being at a certain rate per hour per burner, each of which had three jets, called "cockspurs." These, with argand burners, were the only lights in use in the town until the transfer of the works to the Corporation.

Coming to more modern times, the two gas-works were acquired for £21,493 by the Corporation; the purchase being completed on Jan. 4, 1839. In 1852, the first large gasholder was erected at the Heaton Lane works; and the increasing consumption of gas required a succession of improvements. Finally, in 1877, it was found that new works were absolutely necessary; and a site in Portwood was purchased for the purpose. These works were successfully opened on Nov. 14, 1878. The original retort-house at Portwood, having a capacity of 750 million cubic feet per day, has been extended at each end, and does not now contain any of the original carbonizing plant. The Heaton Lane works have been dismantled—the two gasholders only remaining; and the Millgate works site is used as an electricity station. The present retort-house contains 28 beds of 12 retorts, 22 in. by 15 in., and 15 feet long, placed at an angle of 32 degrees. Each bed is capable of carbonizing 14 tons of coal a day; and there is room at the east end of the house for further settings. The carburetted water-gas plants (two) have each a nominal capacity of 750,000 cubic feet per day, though on many occasions they have each turned out up to 900,000 cubic feet. The condensers are of the annular and water-cooled type.

Other portions of the plant were described by Mr. Alsop; and the following figures were given from the last annual report of the undertaking: Gas sold, 837,500,000 cubic feet; largest make in 24 hours, 3,888,000 cubic feet; largest delivery in ditto, 4,115,000 cubic feet; make of gas per ton, 12,656 cubic feet; coke made for sale, 9 cwt. per ton of coal carbonized; percentage of gross profit on outstanding loans, 19·17; percentage net profit on ditto, 10·8; net profit, £26,657; allocated in aid of rates, £22,000; reserve, £4657; price of gas, 2s. 6d. per 1000 cubic feet, less 2d., inside the borough, and 2s. 10d. outside, less 2d. Differential discounts up to 10d. per 1000 cubic feet are allowed on gas used for industrial purposes. Additional discounts came into force in 1909. The minimum price inside the borough is 1s. 3d. per 1000 cubic feet and 1s. 6d. outside. Three-halfpence in the shilling is allowed to prepayment meter consumers. There are no meter-rents (they were abolished in September, 1896); and eight-hour shifts for stokers have been in force since 1892.

Hospitality of the Gas Committee.

At the invitation of the Gas Committee, the visitors had tea together at the Bulkeley Hotel, Stockport. Mr. D. V. Hollingworth, F.C.S., the President of the Association, occupied the chair. He was supported by Alderman Fernley and other members of the Committee, Mr. Meunier, and Mr. Alsop. At the close of the repast,

Mr. W. L. Heald (Preston), the Vice-President of the Association, moved a vote of thanks to Alderman Fernley and his colleagues on the Gas Committee, for their kindness in arranging for the members of the Association to visit the gas-works, and also for the hospitality that had been extended to those taking part in the day's proceedings. He recalled the fact that it was ten years since the Juniors were at Stockport, and in the meantime great improvements had taken place at the gas-works. No one making an inspection of them could fail to be impressed by the progressive views of the management and the Committee. In the ten years, the undertaking had grown at an almost abnormal rate; and much of this was undoubtedly due to the Engineer, backed up by his Committee. He (Mr. Heald) desired also to say that the members of the Junior Association were greatly indebted to the Committee for the assistance given them financially in regard to the University Lectures. And the fact that Alderman Fernley honoured them by taking the chair at one of the lectures was evidence of his appreciation of the efforts of members of the Association to better themselves.

Mr. R. H. Ginman (Birkenhead) seconded the motion; observing that the members certainly owed the Stockport Gas Engineer and his Committee a deep debt of gratitude for the very kindly interest they had taken in the proceedings of the Association.

The President, in putting the motion, assured Alderman Fernley that the members had enjoyed immensely their inspection of the Stockport Gas-Works.

Alderman Fernley, responding, said the Gas Committee were amply rewarded for what had been done by seeing so many present; taking, as he had personally observed, so enthusiastic an interest in the work in which they were engaged, and endeavouring to gain information which would make for greater success. As to the Gas Committee's contribution to the University Lectures fund, he hoped the Association would be successful in getting other corporations and companies to subscribe. It was a pity an Association like theirs should be shackled for want of funds; and he hinted that it was not unlikely his Committee might be disposed to contribute a little more. [Applause.] But they must get other corporations and gas companies to contribute, so that it could not be said against the Stockport Corporation by its critics that it stood alone.

Mr. J. Taylor (Mossley) proposed a vote of thanks to Mr. Meunier and his staff. As to the Gas Engineer, he said he need not enlarge upon the respect and esteem in which he was held by his colleagues, or upon his abilities as an Engineer, samples of which the visitors had just seen for themselves. He was a past-President of the Manchester District Institution of Gas Engineers, had read papers before the parent Institution, and was Chairman of the Commercial Section of the Manchester Institution. He (Mr. Taylor) should say that there was no more worthy Chairman of a Commercial Section in the country than Mr. Meunier, who was held in very high esteem by the whole of the profession. The speaker also referred to the services rendered by Messrs. Sowerbutts, Alsop, and Bowden.

Mr. J. Robinson (Altrincham) seconded the proposition, and paid a special tribute to the way in which Mr. Alsop discharged his duties as Hon. Secretary of the Association.

Mr. Meunier, who was very cordially received, said, like the Chairman of the Gas Committee, he did not think a vote of thanks was necessary for what they had done that afternoon. If they had done a little to help forward the gas industry, they were more than recompensed. What were they there for? Was it not to help to advance the great industry to which they were so proud to belong? If the Juniors were to have to fight "all on their own," their task would be a very hard one. But with the help that could be, and was being, given to them, they were being brought to a higher status, a higher scientific level, which all tended to place the gas industry on a higher standing. It was a pleasure to him to know that he had had "a little finger in the pie" in the establishment of the University Lectures; and he supported what Alderman Fernley had said about other corporations and gas companies holding out the helping hand in £ *s. d.* proportionately to their size. He hoped those present who were in a position to do so would bring influence to bear upon their rulers to do something in this way. If this were done, he was sure they would attain what they had in view. In conclusion, he paid a high tribute to the members of his staff.

This brought to a close the proceedings at the tea. There followed, however, an evening meeting, at which a discussion took place on "Wet Purification of Coal Gas," introduced by Mr. C. E. Woodhead. Members of the Technical Press present were asked not to report the "notes" read by Mr. Woodhead, or the discussion upon them.

SCOTTISH JUNIOR GAS ASSOCIATION.

EASTERN SECTION.

Visit to Newtongrange Collieries and Gas-Works.

On Saturday, upwards of forty members of the Eastern Section of the Scottish Junior Gas Association availed themselves of the opportunity to visit the Newbattle Collieries at Newtongrange, and also the gas-works, both of which are the property of the Lothian Coal Company. The gas-works are well equipped for their size, and are under the care of Mr. Alexander Bishop, the President of the Eastern Section.

It was noticed with much interest that there was in course of construction a new purifying extension. The works serve the district of Newtongrange; and at the Newbattle Colliery, the whole of the extensive surface of the works is lighted by incandescent lamps from the same source. The visit of inspection to the Lady Victoria pit was an interesting one; every facility being given for witnessing the various stages of coal getting. A section of the famous seam of cannel coal, which is so largely used for the manufacture of gas, was shown. The shaft of the Lady Victoria pit is 1650 feet in depth; and the furthest off workings are about 4 miles from the bottom of the shaft.

At the conclusion of the inspection, the company were entertained at tea in the Dean Tavern Inn. Mr. Bishop proposed a vote of thanks to the Lothian Coal Company for their kindness and hospitality; and Mr. Callender, the Secretary, acknowledged the vote in a brief speech. He recalled how the enormous development of the gas industry had caused a corresponding increase in the output of coal, and mentioned also how the great impetus that had been given to incandescent gas lighting had enabled a lower grade of coal to be used, and so brought about a cheaper gas than formerly.

EFFECT OF VARIOUS DILUENTS ON THE CANDLE-POWER OF OIL GAS.

By Dr. Arthur H. Elliott, of New York.

[A Paper Read before the American Gas Institute.]

The following experiments were made in order to ascertain what effect the so-called diluents in illuminating gas had on the illuminating power of such gas. It has been known for many years that, if you mix oil gas with true water gas (carbon monoxide and hydrogen), a considerable volume of oil gas may be added before any illuminating effect appears in the flame. The determination of the actual extent of this effect was the cause of the investigations given in this paper. Unfortunately, when the experiments were made, no true oil gas was obtainable; but a mixture of water gas and oil gas rich in the latter was used, and the data herewith presented were obtained. It is hoped they will be a useful contribution to applied chemistry.

The first step in the investigation was the preparation of a quantity of carbon monoxide. This gas was made by heating a mixture of oxalic acid with concentrated sulphuric acid, and washing the products with water and sodium hydroxide solution. This gas was free from carbon dioxide, and on analysis gave the following results:—

	Per Cent.
Carbon monoxide	94·5
Oxygen	1·1
Nitrogen	4·4

The gas thus prepared was mixed in a regular 5 cubic foot test holder, having an annular water ring tank with a generator oil gas having the following composition:—

Oil Gas A.	Per Cent.
Illuminants	30·9
Oxygen	0·7
Carbon monoxide	13·3
Hydrogen	12·8
Marsh gas	39·6
Nitrogen	2·7

Making a regular photometric test, using a Bray 1-foot acetylene burner (the gas burning at the rate of 1 cubic foot per hour), the candle power of this gas was 41·3 for a 5 cubic foot rate per hour. Assuming that water gas contains 44 per cent. of carbon monoxide, by calculation, the above oil-gas mixture contains 70 per cent. of oil gas (illuminants, marsh gas, &c.). By calculation, if this oil-gas mixture was free from water gas, its illuminating power would be 59 candles for a 5 cubic foot rate per hour. This is calculating for dilution only.

Using the two gases above tested, two mixtures were made from them containing approximately 10 and 30 per cent. of the oil gas. By actual measurement, the following mixtures were obtained:—

	Volumes. No. 1.	No. 2.
Carbon monoxide	91·0	67
Oil gas A.	9·0	33

These mixtures contained the following gases per cent. by volume:—

	No. 1.	No. 2.
Illuminants	2·8	10·2
Oxygen	1·2	0·8
Carbon monoxide	86·2	66·8
Hydrogen	1·2	4·2
Marsh gas	3·7	13·0
Nitrogen	4·9	5·0

Making the regular photometric observations, the gases burning at the rate of 5 cubic feet per hour in a flat-flame Bray burner that appeared best adapted to the flame, the above mixtures gave the following candle powers:—

No. 1 = 1·0 No. 2 = 14·7

The next observations were made upon a mixture of hydrogen and oil gas (Sample B). The hydrogen gas was made with zinc and sulphuric acid, and well washed with water. This gas contained 97·6 per cent. of hydrogen, 0·5 per cent. of oxygen, and 1·9 per cent. of nitrogen (from air). As this test required a new sample of oil gas, an analysis of the oil gas used was made, with the following results:—

Oil Gas B.	Per Cent.
Carbon dioxide	0·5
Illuminants	31·5
Oxygen	0·7
Carbon monoxide	11·7
Hydrogen	13·8
Marsh gas	38·8
Nitrogen	3·0

A regular photometric test made with a Bray 1-foot acetylene burner (as with Sample A), gave for the candle power of this gas, if burning it at a rate of 5 cubic feet per hour, 52·3.

As it was expected that hydrogen would behave like carbon monoxide in giving a low candle power, the 10 per cent. mixture was omitted, and a mixture of Oil Gas B and hydrogen was made, as follows:—

	Volumes.
Hydrogen	67
Oil gas B	33

This gas mixture had the following percentage composition:—

	Per Cent.
Illuminants	10·4
Oxygen	0·6
Carbon monoxide	4·0
Hydrogen	70·0
Marsh gas	13 0
Nitrogen	2·0

The candle power of this mixture, burned in a Bray flat-flame burner, at 5 cubic feet per hour, was 20·5.

Calculating from the carbon monoxide (44 per cent.) in water gas, the Oil Gas B, contains 73·4 per cent. of true oil gas. Also calculating from the candle power (52·3), if water gas was absent the candle power of the oil gas would be 71, burning at a 5 cubic foot rate per hour.

Another mixture was made, using marsh gas and Oil Gas C, which latter had the following composition:—

Oil Gas C.	Per Cent.
Carbon dioxide	0·5
Illuminants	30·6
Oxygen	0·4
Carbon monoxide	5·9
Hydrogen	17·6
Marsh gas	42·3
Nitrogen	2·7

The candle power of this oil gas, burned in a 1-foot Bray acetylene burner, and then calculated for 5 cubic feet per hour, was 50. The marsh gas used was made from aluminium carbide, and had the following composition:—

	Per Cent.
Carbon dioxide	—
Illuminants	—
Oxygen	0·2
Carbon monoxide	—
Hydrogen	8·3
Marsh gas	90·6
Nitrogen	0·9

The candle power of the marsh gas was 4·5, burning at a 5 cubic foot rate per hour.

By calculation, Oil Gas C contains 86·6 per cent. of oil gas (water gas = 44 per cent. carbon monoxide). Calculating from the candle power (50) obtained with this oil gas, and that it contains 86·6 per cent. of oil gas, this oil gas free from water gas should have 57·7-candle power.

The marsh gas and Oil Gas C were combined in the following proportions:—

	Volumes.
Marsh gas	91
Oil gas C	9

The composition of this mixture is as follows:—

	Per Cent.
Carbon dioxide	0·0
Illuminants	2·8
Oxygen	0·0
Carbon monoxide	0·5
Hydrogen	9·2
Marsh gas	86·3
Nitrogen	1·2

Burned at the rate of 5 cubic feet per hour, this mixture has a candle power of 7·7 in a Bray flat-flame burner.

In testing the several gas mixtures made and used above, the following data are obtained.

In the oil-gas mixtures used to start with, called Oil Gas A, B, and C, we note the following values in regard to candle power:—

	Candle Power.
In oil gas A, 1 per cent. of illuminants	= 1·337
,, B, ,, ,,	= 1·660
,, C, ,, ,,	= 1·634

The candle value of 1 per cent. of illuminants as given above may be stated thus: If in Gas B the illuminating value is taken as 100, then Gas A is 80 and Gas C is 98, which gives the relative value of the illuminants in the various oil-gas mixtures used in the experiments, and shows that the illuminants are not of the same candle value in each gas. But when we begin to add more carbon monoxide to the Oil-Gas Mixture A, we obtain a loss of candle power which is more than the effect of dilution would lead us to expect. Taking Mixture No. 1, we see that there is 2·8 per cent. of illuminants in it, obtained from Oil Gas A, where each per cent. of illuminants is equal to 1·337-candle power (at the 5 cubic foot rate). Therefore, if we multiply the candle power of each per cent. of illuminants by 2·8, we obtain a value of 3·74-candle power; whereas by actual test we only obtain 1-candle power—a loss of about 75 per cent. of the light. Applying the same calculation to Mixture No. 2, we obtain 14·04 as the candle power of the gas mixture; while an actual test gives 14·7 for this mixture—a fairly good concordance, and practically little loss of light.

Looking, now, at the experiment with a mixture of oil gas and hydrogen, we obtain the following figures: 1 per cent. of illuminants in the oil gas used (B) is equal to 1·660 candle power (at the 5 foot rate). In the mixture with hydrogen, we have 10·4 per cent. of illuminants, which, multiplied by the value of 1 per cent. of illuminants in the oil gas used (1·660), gives 17·3 as the candle power of that gas mixture after dilution with hydrogen. But when we apply the photometer to the mixture, we get 20·5-candle power, when burning at a 5 cubic foot rate per hour. This is an increase of candle power of over 18 per cent., which is clearly due to the influence of hydrogen in the mixture. Or the candle value of 1 per cent. of illuminants in the hydrogen mixtures becomes 1·952, instead of 1·660, which it has in the Oil Gas C used. Or, if we compare with the corresponding mixture made with carbon monoxide, we have here an increase of 39 per cent. in the candle power.

The mixture of marsh gas with oil gas gives us some more interesting data. In the Oil Gas C used in this latter test, we have 1·634 as the candle value of 1 per cent. of illuminants; and we make a mixture of this gas with marsh gas—the final mixture having 2·8 per cent. of illuminants. By calculation for dilution from the oil-gas value (1·634), we get (1·634 × 2·8) 4·6-candle power for the 5 cubic foot rate. By actual test with the photometer, we obtain 7·7-candle power for the 5 cubic foot rate per hour. This is an increase of 67 per cent. in the value of the illuminants in the oil gas when burnt in conjunction with marsh gas.

But it may be said that the marsh gas has a candle value of its own. Burned at the rate of 5 cubic feet per hour in a Bray flat-flame burner, marsh gas gives 4·5-candle power; and 67 per cent. only of it was used with the oil gas, which would add 3 candles to the value of the mixtures. As the calculated candle power was 4·6, and the marsh gas added 3 more candles, we thus get a total of 7·6 candles as the value of the two gases, which is closely checked in the photometric test of the mixture (7·7-candle power). It would, therefore, appear that the presence of marsh gas does not increase the value of the illuminants in a mixture, except from the value it adds from its own combustion. But marsh gas also does not nullify candle power in a mixture with oil gas, as seems to happen in the case of the addition of carbon monoxide to oil gas.

THORIUM AND ITS COMPOUNDS.

A lecture on this subject was delivered by Mr. Edmund White, B.Sc., F.I.C., at the Finsbury Technical College, last Friday.

The lecturer gave a short account of thorium since its supposed discovery by Berzelius in 1817 in the mineral gadolinite. Berzelius afterwards found that the substance he had christened "Thorium," from the name of the Scandinavian god "Thor," was not an element; but he used the name in 1828 for an element which he discovered in the mineral called "Thorite." Thorium occurs in Norway in a large number of minerals, which are, however, only found in small quantities—such as aeschenite, euxonite, gadolinite, samarskite, xenotime, monazite, orangite, and thorite. The monazite sand deposits in Brazil form the chief commercial source of thorium at the present day. Monazite is found in many parts of that country, but the chief supplies have been drawn from sand found on the seashore. This sand was first shipped to Europe as ballast; but now that its value is known, it is only allowed to be shipped after payment of royalities and other charges. Monazite sand also occurs in North America, India, Australia, Nigeria, the Straits Settlements, and South Africa.

The process of concentrating the crude sand deposits by means of running water, followed by magnetic treatment, was described and illustrated by lantern slides; the problem being to remove the monazite in as pure a condition as possible from the complex mixture of minerals constituting the crude deposit. The lecturer pointed out that purified monazite should contain not less than 5 per cent. of thorium oxide. The importance of thorium in the gas lighting industry was referred to; the world's requirements in gas-mantles being estimated at about 400 millions annually. The interesting mineral thorianite was mentioned as an ideal mineral for the extraction of thorium; but the lecturer said that it was not available in sufficient quantities to be of much commercial importance.

The value of monazite depends upon the percentage of thorium oxide it contains. This proportion is determined by analysis; and various processes of analysis were described. General methods employed in the extraction of thorium were also dealt with; attention being drawn to the difficulties which arise from the thorium being associated in monazite with from ten to twelve times its weight of the cerite earths. The latter bodies so closely resemble thorium in their solubility and other properties of their salts, that a sharp separation in one or two operations is not possible. Hence methods based upon fractional crystallization and precipitation must be employed, which render the extraction tedious and expensive. The finished product, thorium nitrate, is prepared in white crystalline masses or granules which are very soluble in water. Commercial standards for the purity of thorium nitrate were described and illustrated experimentally; the peculiar property of the substance in swelling-up and yielding a voluminous ash forming a striking experiment. Delicate tests were given to detect the presence of possible impurities—such as cerium, lanthanum, didymium, phosphoric acid, iron, aluminum, calcium, magnesium, and sodium.

The lecturer exhibited an interesting collection of minerals and thorium compounds, and also lantern slides showing the composition of crude and purified monazite.

WELDING HIGH-PRESSURE PIPE-LINES.

The Oxy-Acetylene Method.

A recent number of the "American Gaslight Journal" contained a communication on the above subject by Mr. Leon B. Jones, of the Engineering Division of the Gas Department of the Pacific Gas and Electric Company of San Francisco. In view of the increasing use of high-pressure gas, the following extracts from the article may be interesting.

Since the transmission of gas under high pressure has come into common use, many have been the dreams of the members of the gas fraternity of a faultless coupling. Improvements in the manufacture of pipe, and the development of the seamless drawn steel tubing, leave little to be asked in the way of pipe; but, as a chain is no stronger than its weakest link, so is a pipe-line no stronger than its weakest joint. Heretofore, the couplings or joints have been the short-lived part of high-pressure pipe-lines. In practically all the couplings now in use, a compressible elastic gasket is necessary. Rubber has been used in joints of most of the pipe-lines in California; but as the short time in which rubber loses its elasticity is greatly decreased by the rotting effect of the compression liquids of the gas, the life of rubber gasket joints is very much less than the life of the pipe.

Pipe-lines have been abandoned or removed because the elasticity of the rubber in the joints was gone and every coupling was a leak; and still the pipe, if undisturbed, would have had a considerable life. In some cases the gaskets were removed after several years, and the pipe was still in good condition. Up to the present time, the life of high-pressure pipe-lines, laid in the average soil, has been the life of the joint.

With the recent developments in oxy-acetylene welding, a new era has been reached in the transmission of gas under high pressure. It is now possible to lay a pipe-line without couplings of any sort—a steel-to-steel tube in which the joining of the lengths is of the same material as the pipe. Welding with the oxy-acetylene torch has been successfully done in the large shops for several years; but the recent installation of an 8-inch high-pressure line in San Francisco is unique in the adaptation of this process to the welding of high-pressure gas-mains.

The oxy-acetylene torch develops a flame temperature which may conservatively be estimated at 6000° Fahr.; and it may be readily seen that, with this temperature concentrated in a small pencil flame under perfect control, all metals become amenable to the will of the operator. The welding of iron, steel, copper, or brass is accomplished with greater ease and rapidity than the soldering of tin; for when this powerful little flame impinges on steel the metal becomes molten in a few seconds.

The recent installation of approximately 5000 feet of 6-inch steel tubing in San Francisco, in which oxy-acetylene welding was used on every joint, was laid under the most difficult conditions, which afforded an excellent opportunity for practically testing the adaptation of welding to high-pressure gas-mains. This line was laid in a certain street at the time that the Municipal railroad was under construction, and this necessarily caused many obstructions and difficulties. But in every case the oxy-acetylene welding proved itself equal to the occasion, and all difficulties were surmounted.

There are three separate methods in which pipe may be handled

when welding with the oxy-acetylene torch. Bell holes may be dug as for any coupling, and the pipe welded in the ditch; or the pipe may be lowered into the ditch and turned while the welds are being made. Thus the welding of many of the joints is done on the top of the pipe, and the necessity for digging large bell holes at every joint is avoided. The third method, which was found the most practicable where conditions will allow, is to put short pieces of timber across the top of the ditch at intervals, rolling the pipe into place directly over the ditch. This method ensures a good alignment of the joint, and requires the least labour. With it two men can turn as much as 500 feet of pipe while the operator is welding the joints; and as a 500-feet length is about as long as can be conveniently handled, it will thus only require a bell hole and a well in the ditch every 500 feet.

While it is possible to make a good weld without turning the pipe, a great deal more time and care are necessary than when the pipe is turned and the welding done on top of the joint. In welding the under side of a joint in the ditch, it is not possible to pile up the metal, as it is when welding is done on top. A joint being welded in the ditch is also more often allowed to cool before the weld is completed; and this leaves a possibility of pinholes where the weld is commenced again.

To ensure against the possibility of the mould not extending through the entire thickness of the pipe, the ends of the lengths to be welded were left about $\frac{1}{8}$ inch apart, and the operator worked with a rod of 3-16ths inch Norway iron in his left hand. This iron is melted into the joint to take care of the gap, and also to build up the metal round the joint. In this way the ends of the pipe are perfectly welded, and the metal at the joint is thicker than in the pipe—thus rendering the joint the strongest part of the whole line.

To prove the statement that the weld is as strong as, if not stronger than, the rest of the pipe, sample welds were made, and the pipe was afterwards flattened and bent until it was broken. In every case the break occurred at the back of the weld in the pipe, and not across the joint. A more practical test, which will appeal to gas men, was also made, as follows: Two 40-feet lengths were supported on timbers laid across the ditch, and the ends welded together. All the supports were then removed from under one of the lengths, and the entire weight of the 40-feet length was suspended on the joint. The weld was in no way affected by this severe treatment.

After several hundred feet of pipe are welded into a section, the supports are removed one at a time, and the pipe reeled into the ditch like so much cable. Careful handling is no longer necessary, as a weld, if properly made, will stand the same treatment as the pipe; and any defect is better detected before the pipe is covered.

It may be readily seen that, when welding the pipe on top of the ditch into sections several hundred feet long, it is possible to work several welding outfits at the same time with the minimum of labour. If a little care is exercised in distributing the pipe along the ditch, two men can readily roll it into place, over the ditch, for welding. In many cases, after these sections were reeled into the ditch, the ends of the sections were several feet apart. To avoid using a short piece of pipe and making two welds, a block and tackle were used, and, with an automobile for motive power, these sections (in some cases 500 feet long) were dragged several feet in the ditch, to meet the end of the next section.

As the tubing which was used on this line was approximately 3-16ths of an inch thick, and would not permit of threading, the question arose as to how the valves or governors should be connected. This was solved in a very simple manner. A short piece of 8-inch standard pipe was threaded on to a standard flange. The pipe, which was 8 inches inside diameter, was then slipped over the tubing, which was 8 inches outside diameter. After the valve or governor was installed and the flanges were bolted up, the end of the standard pipe was welded to the tubing. This installation, which represented about 180 joints, was welded throughout its entire length. At the end of each day's work, the line was tested to 150 lbs. pressure, and allowed to stand overnight. As an extra precaution, the joints were also gone over with soapsuds. After completion, the entire line was tested to 150 lbs. pressure, and the line stood at this for three days without loss.

The success of oxy-acetylene welding in the field of high-pressure gas distribution depends largely upon the cost of operation, and its ability to conform to the general conditions existing in high-pressure work. Such an apparatus, to meet the requirements of the present-day gas man, must be economical, reliable, and safe. Acetylene gas, of all the hydrocarbon gases, most nearly approaches pure carbon. It is more than 92 per cent. carbon, and has a heating value of 1635 B.Th.U. per cubic foot, which partly explains the very remarkable temperatures attained with the oxy-acetylene blowpipe.

Acetylene requires for complete combustion 12½ times its volume of air, or 2½ times its volume of pure oxygen. If complete combustion were attained by burning acetylene with 2½ times its own volume of oxygen, the products of combustion would be carbonic acid and water. However, it has been practically proved that the best welding results are obtained by the use of slightly more than 1½ volumes of oxygen to 1 volume of acetylene. With this incomplete combustion, the products of combustion change, and instead of carbonic acid and water, carbon monoxide and hydrogen are formed. To this formation of hydrogen, which surrounds and envelops the point of welding, is attributed the credit for the fact that the oxy-acetylene method of welding, unlike many of the other methods, has no injurious effect on the metal.

From the foregoing it will be seen that the cost of the oxygen for the oxy-acetylene torch is materially less than would be calculated. The torch is constructed on the injector principle, in which the oxygen and acetylene are brought through separate tubes to within about an inch of the point of combustion. The acetylene is usually conveyed direct from the generator through hose connections to the torch, at a pressure between 3 and 5 lbs. per square inch. The oxygen, stored in tanks, is used through a reducing valve and hose connections to the torch at between 15 and 20 lbs. per square inch. On the handles of the torches are controlling-valves, whereby a nicer regulation is attained. For lighting the torch, the acetylene is first turned on full and ignited. Oxygen is then added until the flame becomes a single cone. An excess of acetylene produces two cones and a white colour, while an excess of oxygen produces a violet tint.

The hourly consumption of the torch used for 8-inch steel tubing was 24 cubic feet of acetylene and 30 cubic feet of oxygen. Using acetylene direct from the generator, at a cost of 1 c. per cubic foot, and oxygen from tanks at 6 c. per cubic foot, the cost of operating the torch would be $2·04 per hour; and, allowing 40 c. per hour for the labour of a workman, the total cost of operation would be $2·44 per hour. As the average time necessary to weld a joint on top of the ditch, where the welding is done on top of the pipe, is ten minutes, the cost of such welds would be slightly over 40 c. per joint. The time necessary to weld a joint in the ditch, where the operator was forced to weld underneath the pipe, was 28 minutes per joint—making the cost of these joints $1·13 each. But if the pipe is welded into long sections on the ground, it is only necessary to have a weld in the ditch to every ten joints welded. This would make an average cost of 49 c. per joint, which would be approximately 2 c. per inch of circumference on steel tubing 3-16ths inch thick. From this can be estimated the cost of welding various sizes and thicknesses of pipe, as the time per weld and the consumption of oxygen and acetylene would increase in proportion to the size and weight of the pipe.

[The article was accompanied by several illustrations showing the method of welding described.]

WATER SUPPLY OF THE METROPOLIS.

Ninth Annual Report of the Metropolitan Water Board.

We have received from the Clerk to the Metropolitan Water Board (Mr. A. B. Pilling) a copy of their ninth report, dealing with the work of the Board in the year to March 31 last.

The report opens, as usual, with some explanatory observations on the constitution of the Board, of which the present is the third since its formation under the Metropolis Water Act, 1902. The members met for the first time on June 3, 1910; and they will go out of office on June 1, 1913. At the first meeting, Mr. E. B. Barnard was unanimously re-appointed Chairman and Mr. G. S. Elliott Vice-Chairman for the ensuing three years. The Board held fourteen meetings during the year. An interesting feature of the Board's proceedings last year was the presentation of an address to their Majesties the King and Queen, on the occasion of their return, through North London, to Buckingham Palace, after their visit to the Guildhall on the 29th of June. The address was presented by a deputation consisting of the Chairman and Vice-Chairman, the Clerk, and the Chief Engineer (Mr. W. B. Bryan, M.Inst.C.E.) of the Board.

The actual administration of the Board is in the hands of seven Committees—viz., the Appeal and Assessment, Claims, Finance, General Purposes, Law and Parliamentary, Water Examination, and Works and Stores. The number of salaried officers on April 1 was 886, whose salaries amounted to £158,049. The number of workmen and others on weekly wages at the close of the financial year was 3142; and the service staff on weekly wages was 101. The Board granted during the year, under the provisions of the Metropolis Water Act, 1902, 46 superannuation allowances to officers and servants transferred from the late Water Companies; making a total of 400 of such allowances granted since the transfer of the Companies' undertakings to the Board. A superannuation and provident fund for the benefit of the officers and servants came into operation on April 1, 1909, and the number of contributors on March 31 last was 1780—being 502 officers and 1278 servants. At the last-named date, the Board were bearing an annual charge of about £75,260 in respect of superannuations, pensions, and compensation allowances to officers and servants belonging to the Companies.

Turning to the portion of the report dealing with the financial position of the Board, we find that on the 1st of April the funded debt was as follows: "A" stock £6,060,165, interest £181,805; "B" stock £35,386,555, interest £1,061,596; redeemable debenture stocks £7,217,838, interest £216,911—total £48,664,558; interest, £1,460,312. In addition to this, the Board are under obligation to pay certain annuities and rent charges (including the Crown "clog" of £400) which amount to £7900; making an annual interest charge of £1,468,212, which is equivalent to 3·9d. per 1000 gallons of water supplied. The net water-rental for the past year is put approximately at £2,820,800, or £30,119 more than in 1910-11.

From the section of the report furnishing particulars of the

sources of supply, we find they continue to be four—viz., the Thames and the Lea; gravel beds adjoining the main stream of the Thames, and other gravel beds at Hanworth; natural springs; and wells sunk in the chalk or other strata in the Lea Valley, on the north of the Thames, in Kent, and at certain other points south of the Thames. In the twelve months ended March 31 last, the Thames furnished 59·8 per cent. of the Board's total supply, compared with 58·6 per cent. during the previous year. The daily average quantity gauged at Teddington was 1519·4 million gallons—an increase of 81·9 million gallons compared with 1910-11. The daily average total abstraction from the river was 153·6 million gallons. The daily average natural flow at Teddington was, therefore, 1673 million gallons during the year, compared with 1574·4 million gallons in 1910-11. The total volume abstracted from the river was 56,215·6 million gallons, or 6252·8 million gallons more than the preceding year. Compared with that year, there was an increased average daily abstraction from the river of 16·7 million gallons last year. Of the 153·6 million gallons daily average quantity abstracted by the Board and the Suburban Companies, the Board drew 151·1 million gallons and the Companies 2·5 millions. The percentage of the river's natural flow abstracted by the Board was 9·03, and by the two Suburban Companies 0·15, or 9·18 per cent., compared with the total abstraction of 8·69 per cent. in the year 1910-11. There was an increase of 149,157,000 gallons, or 0·80 per cent., in the total quantity of water abstracted by the Board from the River Lea.

The total volume of water supplied during 1911-12 was 89,437·2 million gallons, compared with 82,170·5 million gallons in 1910-11—an increase of 7266·7 million gallons. It should be borne in mind, however, that the past year contained 366 days. The average daily supply was 244·4 million gallons; the figure for 1910-11 being 225·1 million gallons. The southern district took the largest proportion of the total supply—viz., 25·49 per cent.; and the Kent district the smallest—8·9 per cent. The eastern district consumed 20·97 per cent. of the total direct area supply; the New River district, 19·64 per cent.; and the western district, 24·99 per cent. The month of maximum average daily supply was July. The month of minimum average daily supply was April in three districts, March in one district, December in one, and April in general. The difference in the total average daily quantity of water supplied between the maximum and minimum months throughout the area of direct supply was 65·66 million gallons.

The total estimated population supplied by the Board at the close of the year was 7,152,372. These figures, however, and also the tables showing the population and the rate per head per day are based on the figures included in the monthly reports of the Official Water Examiner; the results of the Census taken in April of last year not being available in time for incorporation in the Board's report. Judging, however, from the preliminary report issued by the Census Office, it is considered safe to assume that the figures will require some substantial revision; and it is proposed to deal further with the matter in the next annual report. For the whole area of the Board, the average daily supply per head was 34·02 gallons; while in 1910-11 it was 31·57 gallons. Approximately, 56·97 per cent. of the total population was supplied from the Thames, 21·49 per cent. from the Lea, and 21·54 per cent. from wells and springs. The total number of services supplied at the end of the year was 1,106,996—an increase of 9182 over the preceding year. The average daily supply per service was 219·92 gallons, compared with 204·25 gallons. The increase in the number of services on the constant supply was 9074, or 0·83 per cent. The proportion of supplies on the constant system at the close of the year was 99·22 per cent., compared with 99·23 per cent. before. The New River, eastern, western, and Kent districts are now entirely on constant supply.

In the section of the report dealing with storage, attention is called to the testimony again borne by Dr. A. C. Houston, the Board's Director of Water Examination, to its value in improving the quality of water. The effective amount of storage and subsidence reservoir capacity for unfiltered water possessed and in use by the Board at the end of the year was as follows:—

	No.	Area in Acres.	Total Capacity in Million Gallons.
Thames Valley	31	1026·50	7267·5
Lea Valley	17	530·25	2499·2
	48	1556·75	9766·7

The total storage in existence, in course of construction, and authorized but not commenced, is as follows:—

Storage.	Thames. Million Gallons.	Lea. Million Gallons.	Total. Million Gallons.
Existing	7,267·5	2499·2	9,766·7
Constructing	..	3000·0	3,000·0
Authorized, but not commenced	10,300·0	2000·0	12,300·0
Total.	17,567·5	7499·2	25,066·7

The figure of 9766·7 million gallons is exclusive of the Hampstead and Highgate ponds, the Camden Park Road reservoir for pond water, and the Cheshunt disused reservoirs—in all, fifteen reservoirs with a total area of 48·25 acres, and a capacity of 68·9 million gallons. Adding these brings up the total number of reservoirs to 63, the area to 1605 acres, and the total capacity to 9835·6 million gallons. The number of filter-beds is 171, of 169·44 total acreage, or 0·79 acre per million gallons average daily supply of filtered water. The average monthly rate of filtration per square foot per hour during the year varied from 0·79 gallon in the Kew Bridge (formerly the Grand Junction) works to 2·12 gallons through Kempton Park beds of the eastern and New River district.

The report of the year's work of the Board would have been incomplete without reference to the severe drought from which the Metropolis, in common with the rest of the country, suffered in 1911. The week of maximum demand for water in 1910 was that ended the 24th of June, when the average daily supply was 261·3 million gallons. During the summer of 1911, this quantity was exceeded on no fewer than twelve occasions; and in the week of maximum demand (that ended July 28), the average daily supply reached 300·1 million gallons. On the 21st of July, it was necessary to commence drawing from the reservoirs in the Lea Valley, as sufficient water could not be obtained from the river itself; and at the rate of abstraction then going on, the supply from the reservoirs would have lasted only about six weeks. The intercommunication system proved of great value in the emergency. An indication of the exceptional character of the summer was the early giving-out of the Chadwell spring, which ceased to yield water on the 20th of July; and on the 12th of September the water in the basin was 9 ft. 7 in. below the outlet. The extraordinary weather conditions tried to the utmost the capacity of the Board's plant; but the supply of water was maintained without any intermission throughout the whole of the Board's area—practically all the mains and nearly every pumping-station being brought into use. The number of complaints of insufficient pressure during the months of June, July, and August amounted to only 374, or at the rate of one complaint per month for every £818 supplies, or for every 57,000 persons served. The Board expressed at the time their great indebtedness to the Thames Conservancy for the admirable manner in which they co-operated with them in regard to the abstraction of water from the Thames to the best advantage; and they placed on record an appreciation of the efficient manner in which the supply had been maintained by the Deputy Chief Engineer (Mr. J. W. Restler, M.Inst.C.E.) and the staff of the engineering department.

The total length of mains *in situ* at the end of March last was upwards of 6334 miles. The diameters range from 2 to 54 inches; 4-inch pipes being mostly in use. During the year nearly 38 miles of new mains were laid. The largest extensions were in the western and New River districts; being respectively 26·7 and 22·8 per cent. of the total. The length of new mains laid per additional service varied from 19·3 yards in the Kent district to 3·7 yards in the eastern district; the figure for the whole area being 7·2 yards.

The following figures show the increases which have taken place under the Board in the active equipment of water-works since the transfer of the undertakings:

	Before June, 1904.	At March 31, 1912.
Storage reservoirs for unfiltered water	57	63*
Acreage of ditto	873	1605*
Capacity of ditto in million gallons	4077 6	9835·6*
Service reservoirs for filtered water	75	85
Capacity of ditto in million gallons	244·5	314·3
Filter-beds	137	171
Acreage of ditto	139	169·4
Engines	235	270
Horse power of ditto	32,177	41,195
Miles of water-pipes	5,759	6,334

* Inclusive of the ponds, &c., previously referred to.

In the section of the report which treats of the miscellaneous work of the Board, the proceedings in Parliament are first dealt with; the Thames Conservancy Act receiving much attention. Next come references to legal matters; the proceedings in the "Colley's Patents" case being noticed. The important work of the Director of Water Examination (Dr. Houston) is reviewed; and the rainfall records furnished to the Board by Dr. H. R. Mill are mentioned. The total rateable value of the Board's properties is £1,210,996, distributed as follows: Bucks, £791; Essex, £77,652; Herts, £17,388; Kent, £30,993; London, £635,349; Middlesex, £287,297; Surrey, £161,526. It is said that the assessment of the Board's works in certain parishes represents as much as 78, 70·6, and 66·3 per cent. of the total rateable value of the parishes.

Accompanying the report are appendices containing a collection of tabulated statistics, Dr. Mill's report on the rainfall in the Thames and Lea Valleys, and a list of the works authorized and the progress made with them during the year.

Gas Testing in Whitechapel.—At the meeting of the London County Council last Tuesday, Mr. W. C. Johnson, one of the representatives of Whitechapel, inquired of the Chairman of the Public Control Committee (Mr. W. Haydon) if it was a fact that the gas-testing station at Wellclose Square had been closed for three months, and that no testings had taken place during this period. He also wished to know whether or not the station was in the hands of the Gas Company for repairs, and if it was in the Company's interest to carry out the work with great expedition. He further asked what steps could be taken, pending the reopening of the station, to protect consumers in Whitechapel and St. George's-in-the-East from having inferior gas. Mr. Haydon said the station was closed. The repairs which were being carried out were structural, and involved the safety of the house (which was an old one) and its occupants. The work had been complicated by the condemnation of the drains by the Sanitary Authority. He was unable to say whether it was in the Company's interest to carry out the repairs expeditiously. Testings could be made with portable apparatus, and representations in regard to this could, if necessary, be made to the Company; but the testings would have no statutory effect.

REGISTER OF PATENTS.

Fuel of the "Coalite" type.

CLARKE, H., of London Wall Buildings, E.C., and CAMPBELL, J. A., of Ilford, Essex.

No. 15,837; July 7, 1911.

This invention, the patentee states, relates to the production of a smokeless fuel by the partial destructive distillation of bituminous or semi-bituminous coal or similar carbonaceous substance; and the invention has for an object to produce a fuel having a high content of volatile matter that will not easily crumble in handling or in carriage, and that can be readily discharged from the retort in which it is produced.

According to the inventor's specification, the distillation is effected under such conditions as to ensure the retention in the coke residue of a relatively high percentage of volatile matter, and the formation thereon of an exterior crust of hard coke. The distillation is effected within vertical retorts tapered outwardly towards the bottom, and is arrested when the charge has contracted to such an extent as to be free from the walls of the retort—that is to say, at the stage when, upon the doors being opened, the charge falls out of the retort as an integral mass, without the necessity of employing special means for its withdrawal. By arresting the distillation at this stage, a residue is said to be produced having on its exterior a crust of hard coke.

In carrying the invention into effect [no illustration of the plant is given], vertical retorts are preferably employed of oblong section, having an internal width of about 6 inches and of "any convenient" breadth. The retort is made up in short lengths or sections and of fireclay, cast-iron, or other suitable material; and each length or section is "connected with the other by such means as a spigot and socket or other gas-tight connection, by which a continuous vertical retort is formed tapering outwardly towards the bottom door."

The coal to be distilled (preferably in the form of slack) is fed to the retort from the top, where a gas-tight cover is mounted. The retort is maintained at about from 1300° to 1400° Fahr. for from about seven to eight hours—that is to say, "until the charge reaches the condition in which it has contracted sufficiently to fall of its own weight."

"By distillation effected under these conditions, tar is produced uncontaminated with paraffins, and capable of profitable distillation, yielding a high percentage of hydrocarbons of the benzol series, and tar acids rich in crystallizable orthocresol, and pitch of good and tough quality having a low content of free carbon, as well as a considerable quantity of ammoniacal liquor consisting largely of free ammonia, and a gas of high illuminating power and calorific value containing benzol in considerable quantity. Furthermore, the residue produced is surrounded by a crust of hard coke, of from about $\frac{1}{4}$ inch to $\frac{3}{4}$ inch in thickness, almost entirely devoid of volatile matter, while the central mass or core of the residue contains sufficient volatile matter (from about 6 to 10 per cent.) to render it free burning.

"By such a process of distillation a fuel is produced which, by reason of the conditions of its production and of its crust, is adapted to withstand handling and carriage with a very small loss in crumbling, has a high calorific value, and is smokeless in combustion.

"It will be understood that the invention does not consist in the mere distillation of coal within or about the limits of temperature specifically indicated. We are aware that it has been before proposed, for example, to effect the carbonization of coal at 1200° Fahr., for from six to eight hours."

Gas-Meters.

COWAN, W., of Edinburgh.

No. 19,816; Sept. 6, 1911.

This invention relates to wet gas-meters of the type in which means are provided for elevating water from the waste-water chamber so as to automatically maintain the water-level in the measuring chambers of the meter and prevent changes of level due to evaporation—for instance, to the arrangement described in patent No. 26,277 of 1909.

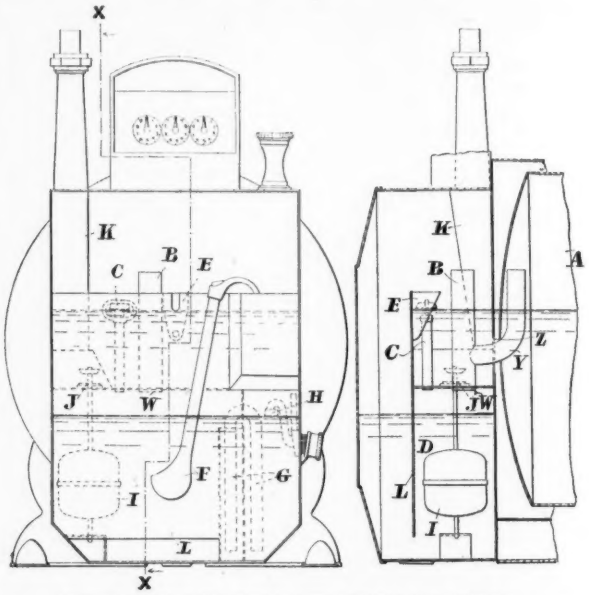
Alluding to his proposal, the inventor says: "Prior to the passing of the Sales of Gas Act, it was usual for the float in wet gas-meters to be operated by the water which was subject to the inlet pressure. When, however, the Act greatly reduced the possible range of water-line, much inconvenience was often experienced in consequence of the closure of the valve at improper times, and under unnecessary circumstances. To meet this difficulty, the expedient of placing the float in the water subject to outlet pressure was largely resorted to; and in most cases it attained the immediate object in view, because the float (while still able to close the valve before gas could pass unregistered) had the tendency to rise rather than to fall during the passage of gas. So long as meters were not required (or allowed) to pass quantities largely in excess of the normal or badged limit, the arrangement answered sufficiently well, and objections did not often arise.

"Some time ago, however, a new fraud was discovered, which consists in the 'flooding' of the meter by the consumer, so that the gas might pass through the centre opening without its being registered by the drum. To overcome this, reversion was made to the old arrangement of float, which made such a fraud impossible, because the valve closed when flooding was employed. Of course, the old difficulty of the short range of water-line was thus re-introduced; but as the fraud in question was no longer possible, the result was considered on the whole to be satisfactory.

"For some time past, however, owing to the extended use of gas cooking and heating stoves, and other like appliances, meters have been more frequently employed to pass quantities of gas largely in excess of the normal or badged amount. This has militated against the employment of the ordinary vertical float (even when protected by a division through which only a small hole admits of the passage and repassage of water to and from the float chamber), because the tendency to extinction of lights, under certain circumstances, still remains.

"This being so, the only complete remedy is the removal of the float from the measuring part of the meter into the waste-water box, so as to free it completely from the influence of both the inlet and the outlet pressure. But a float so placed would not respond to changes of the meter water-line when due to evaporation or other like cause. Hence the necessity for providing a compensating arrangement which would maintain the water-line at the highest point by continuous replenishment from the supply in the waste-box. This is found, for example, in the well-known method of raising the water by means of a reciprocating scoop, and thereby maintaining the level in the meter, so that until the water in the waste-box (which is also the source of supply to the scoop) fails, no closure of the valve can take place.

"I have found that, in practice, a meter of this type can be so carefully flooded that the spout is choked with water and prevents gas passing into the measuring drum, while at the same time gas does pass from the space above the water subject to inlet pressure into the casing of the drum by depressing the water-level, passing away as unregistered gas; and it is the object of the present invention to provide a construction for obviating this. I have found, by experiment, that the provision of a depending plate extending from the front of the spout chamber into the water in the waste-water box effectively prevents fraudulent usage. My invention, therefore, consists in a gas-meter in which automatic compensation of the water subject to inlet pressure is provided with an inlet controlling float in the waste-water box and a division separating the gas entering the waste-water box from that in contact with the water in the spout chamber."



Cowan's Automatic Compensating Water-Level Meter.

An elevation of a meter, with the front plate removed, and a section on the line X (looking in the direction of the arrows) are given.

The meter is provided with a usual measuring drum A with spout, comprising the bend Y and stand-pipe B (open at the top) and syphon C opening into the waste-water box D. In addition, a slotted and perforated pocket E, spoon F, syphon G, and overflow H are provided in the usual manner—for instance, as shown in patent No. 26,277 of 1909. The float I, for opening and closing the valve J in a pocket or chamber at the base of the inlet pipe K, is placed in the waste-water box D. The plate L depends from the front of the spout chamber, and is carried down into, and sealed by, the water in the waste-water box D.

The patentee says he has found in practice that, by providing a seal of this kind when the meter is flooded to choke the bend Y, gas does not pass by the stand-pipe B or syphon C, and is prevented by the plate L from passing in front of the spout chamber, so that the level of the water in the chamber is not depressed. Consequently, unregistered gas cannot pass. "Thus the great advantages of having the float in the waste-box are now attainable with the type of meter referred to above without drawback. It will be understood that this action is independent of the method employed for raising the water from the waste-box to maintain the water-level in the spout chamber."

Incandescent Gas-Burners.

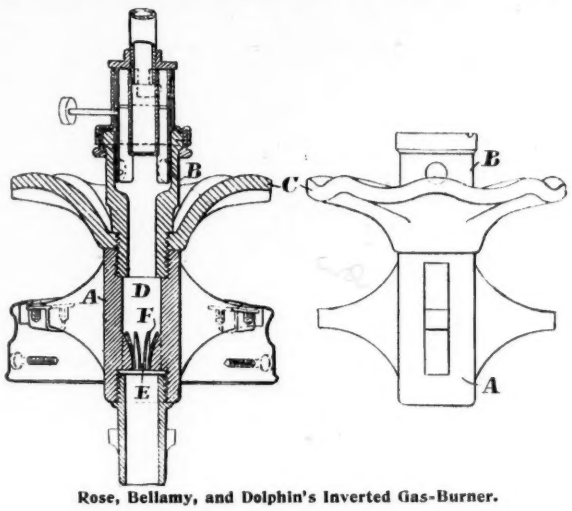
ROSE, A., and BELLAMY, W., of Birmingham, and DOLPHIN, J., of Smethwick.

No. 21,533; Sept. 29, 1911. No. 24,210; Nov. 1, 1911.

This combined invention has reference to inverted incandescent gas-burners constructed of potteryware. It has hitherto been proposed to construct such a burner in a single piece; and the present invention is principally directed to making a burner of potteryware moulded in three separate parts—a top cylindrical part furnished with air inlet holes, a down-tube forming the mixing-chamber, and an air-shield, which prevents the heated fumes from entering the burner. The three separate parts are fired and then fixed together while in the biscuit state; and then glazed and afterwards fired "so that they become irremovable and constitute a single piece."

The down-tube A, forming the mixing-chamber, together with the cylindrical top part B, furnished with the air inlet holes, and the air-shield C (which latter prevents the heated fumes rising from the burner entering the inlet holes) are all formed separately of potteryware.

The air-shield is like a trumpet mouth fixed to or formed with the down-tube immediately below the air inlet holes. The tube A, the upper part B, and the shield C, are made as three separate parts, screwing into one another, with a central hole in the base of the air-shield which will be gripped between shoulders formed on A and C. The three parts are thus fixed together in the biscuit state, glazed, and afterwards fired, so that they constitute one piece as shown.



Rose, Bellamy, and Dolphin's Inverted Gas-Burner.

In order to obviate the necessity of employing any wire gauze in the mixing-chamber for the purpose of preventing the gas lighting-back, the mixing-chamber D is made with a contracted inlet mouth or check at the top and with a contracted outlet mouth or check at the bottom, immediately above the burner-nozzle—both these mouths being of considerably smaller diameter than the interior of the mixing-chamber, and thus, owing to the increased speed at which the gaseous mixture comes into the mixing-chamber through the first mouth or check, and also the increased speed which it issues from it through the lower mouth or check E, any lighting-back from the mantle or outlet nozzle to the gas inlet nozzle at the top of the burner is prevented.

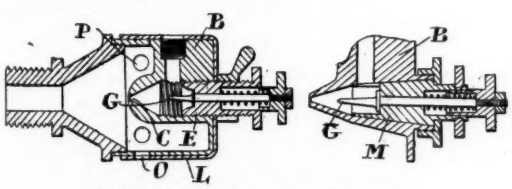
In order to assist in mixing the gas and air as they issue from the chamber D into the burner-nozzle, there is provided inside the mixing-chamber, and preferably at the lower part of the mixing-chamber, a series of inwardly projecting radial teeth or ribs F, formed integral with the tube A extending for a suitable distance up the mixing-chamber—the ribs, at their upper parts, being curved so as to gradually merge into the wall of the mixing-chamber and "thus present a minimum obstruction to the flow of the gaseous mixture to thereby maintain undiminished as far as possible the speed of the same." The ribs project inwardly from the wall of the mixing-chamber for such a distance as to leave a central passage between their ends in addition to the radial spaces which there are between the ribs. The stream of gaseous mixture passing down the mixing-tube to the nozzle is thereby broken up and thoroughly mixed. Moreover, when the burner is alight and the wall of the mixing-chamber and other portions of the burner become heated, the radial teeth or projections assist in heating the gaseous mixture before it issues through the nozzle.

Cleaning Incandescent Gas-Lamp Nipples.

ANDERSON, D., of Farringdon Road, E.C.

No. 22,181; Oct. 9, 1911.

The object of this invention is to improve the construction of gas-burner nipples so that they can be readily cleaned without interfering with the adjustment of the gas supply.



Anderson's Gas-Burner Nipple Cleaner.

In the first form illustrated, the gas is led to the nipple C in a lateral direction, and is controlled by a sleeve E screwed inside the casting B. The sleeve is bored centrally, and in it there is a rod carrying on its end a pin G adapted to enter the nipple centrally and clean it when required. The rod is normally held away from the nipple by a spring. Surrounding the casting which forms the nipple, there is placed a cap L, having apertures O in it adapted to register with apertures P in the casting, so as to regulate the supply of air.

In the alternative construction shown, a conical plug M, seated in a conical hole in the casting, is employed to regulate the gas in place of the screwed member E. A portion of the periphery of the conical member is cut away, so that, by rotating M more or less, the gas-passage is proportionately covered. The spring return plunger mechanism is similar to that in the other form.

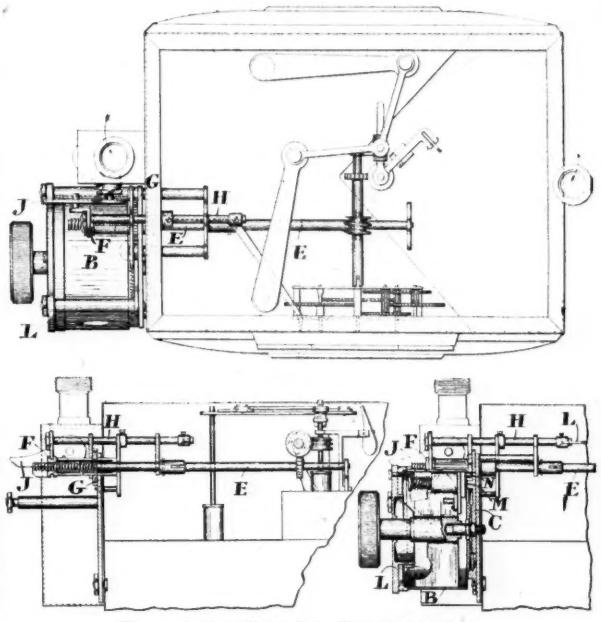
The regulator is contained in a chamber let into the side of the lamp, and is completely shut off from the inside of the lamp, so that no exhaust products can pass through the passages O P which lead to the burners.

Coin-Freed Mechanism for Gas-Meters.

SIMPSON, S., of Exeter.

No. 21,721; Oct. 2, 1911.

This invention has for its particular object to employ a coin-holder and co-operating measuring wheel such as was described in patent No. 22,830 of 1897 for the operation of a valve in the inlet pipe; and, in so doing, "to simplify the construction, to employ a screw measuring device having a fine pitch of thread, and generally to provide coin-freed mechanism simple in construction, compact in arrangement, and effective in operation."



Simpson's Gas-Meter Coin-Freed Mechanism.

In carrying his invention into effect, the patentee mounts the nut and screw-measuring device upon the plate by which the coin-holder B and measuring wheel C are carried; the plate being "suitably secured in a proper position upon the meter casing." The nut F of the measuring device is screwed to correspond with the thread of the spindle E, and is provided with a sleeve loosely surrounding the screwed portion of the spindle. Along the length of the sleeve is a slot adapted to engage with a pin or projection in the bore of a driving pinion G, which is slidably mounted upon the sleeve but is confined in a position adjacent to the measuring wheel C, so as to gear with it. In the bearing plates, there is also carried (parallel with the screwed spindle) a rod member H, at the outer end of which is mounted a fork member adapted to engage a peripheral groove in the nut F, and carrying, at right angles to the spindle E, a contact pin by which the operation of the supply valve controlled by the coin-freed mechanism is effected.

The supply valve casing is adjacent to the casing of the coin-holder B and measuring wheel C, and a valve upon a lever arm carried upon a spindle whose extremity extends to the outside has mounted on it a contact lever J in the form of an open-slotted arm in which there is a slot provided to co-operate with the contact pin mounted on the fork member engaged by the nut F, so that when the nut approaches the extreme inward limit of its travel the contact pin enters the slot and bears against the contact lever to operate the valve I so as to close the valve aperture formed in a conduit leading to the interior of the meter. One part of the contact lever is so formed that, on the contact pin reaching the position with respect to the contact lever corresponding to the full open position of the valve, the contact pin, in its further movement, runs under the edge of the part of the contact lever in such manner that no further movement is communicated to the lever. The inwardly protruding extremity of the screwed spindle E is connected with the meter mechanism so as to permit of its being rotated therefrom. The meter mechanism thus causes the rotation of the screwed spindle E for the purpose of returning the nut F to its original position to close the supply valve.

The measuring wheel C is integrally provided with teeth on its periphery, by means of which the movement may be communicated to the driving pinion G, as well as a laterally disposed circular series of ratchet teeth by means of which the rotation of the measuring wheel by a coin may be effected in known manner. It is carried upon a stud secured to the foundation plate, and is pressed into contact with the plate by a spring washer and nut.

The coin-holder B consists of a hollow cylinder or ring supported by radial arms upon a central spindle—one of the radial arms being provided to carry the coin when it is inserted through the slot. The spindle is recessed at the inner end to seat upon the projecting end of the stud, and is borne at the other side of the cylinder or ring in an adjustable cam-plate L. An operating handle is mounted upon the outer extremity of the spindle. The rotation of the coin-holder is limited by a stop N which, when the holder is in position for the insertion of a coin, contacts with a stop on the foundation plate, while in the discharge position of the coin-holder, it contacts with another similar stop.

In operation, when a coin has been inserted in the slot of the coin-holder, and the latter is rotated by the handle, the coin engages with the inclined leading edge of the cam, and, rising upon the cam, is pressed towards the measuring wheel—thus forcing the pawl M into

engagement with the teeth of the wheel and carrying the wheel round with it. The pinion is thus rotated, and itself rotates the nut F, which travels outwardly along the spindle E and causes the contact pin to operate the valve I to admit gas to the meter. When the number of coins necessary to prepay the maximum amount is inserted, a stop is brought into position to engage with the stop N and arrest the rotation of the coin-holder and thus render the coin mechanism inoperative.

Retort-House Governors.

BERRY, J., and GLOVER, W. T., of Oldham, and METERS LIMITED, of Manchester.

No. 27,582; Dec. 8, 1911.

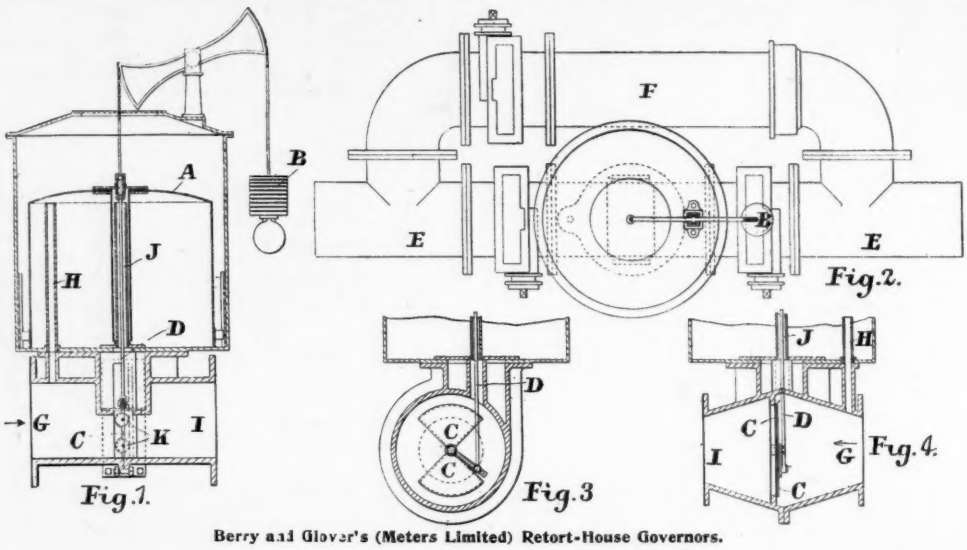
This invention has for its object to simplify the foul-main governing arrangements in retort-houses and to prevent or minimize the deposition of readily condensable hydrocarbons.

Heretofore, the patentees remark, it has been proposed to provide a wind-type valve in the foul main, actuated by a diaphragm, one side of which is under atmospheric pressure while the other is under the pressure of the foul main. Piston type valves, in connection with rising and falling bells arranged in right-angle bends between the gas-pipes, have also been proposed, as also have ported valves (operated by bells) tightly fitting against their seats, which are disposed at right angles to the gas flow.

Two forms of their improved combination and arrangement of parts are shown. Fig. 1 is a sectional elevation of one form of governor. Fig. 2 is a plan showing the general arrangement of the governor in the gas plant. Figs. 3 and 4 show a modified form of valve.

There is the usual bell device A, with its attendant balance or counter-weights B, and a full-way valve C is attached to the bell by a rod or spindle D. The valve is a free fit within its seat, which is provided directly within the foul main E itself (see fig. 2). The bye-pass passage F is provided for use when the governor gear is put out of service for any cause. The interior of the bell is placed in communication with the inlet side G of the valve C by the conduit H. The bell is also in communication with the exhauster on the valve outlet side by way of the pipe J; for, as already stated, the valve is a free or loose fit within its seat. The valve carries rollers K, which run upon the valve-seat so as to reduce friction.

With this arrangement, when the demand exceeds the supply, the exhausting action past the valve plates acts upon the bell A to draw it downwards and close the valve; while when the supply exceeds



Berry and Glover's (Meters Limited) Retort-House Governors.

the demand, the pressure in the foul main E acts to raise the bell and open the valve.

Instead of employing the rising and falling plate C, there may be the rotating disc-valve shown in figs. 3 and 4, which is actuated from the bell by the spindle D in the manner described. The disc-valve does not contact-with its seat but stands clear of it, so as to allow of the governing action already referred to.

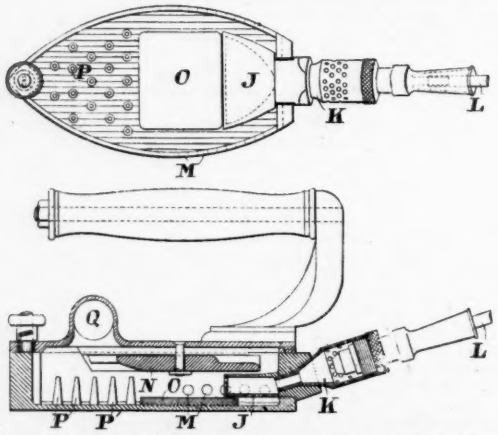
By the employment of a valve arranged to open in a direction at right angles to the gas flow in the combination shown, and by placing the valve directly in the foul main, the patentees claim to "obviate or minimize the deposition of hydrocarbons in the foul main and adjacent to the governor, due to the bends and restricted passages at present usual producing different velocities of flow and variations of vapour tension in the governor connections."

Gas-Heated Irons.

CHANDLER, D., and the SOUTH METROPOLITAN GAS COMPANY, of Old Kent Road, S.E.

No. 8513; April 10, 1912.

The iron comprises a hollow box filled with an insulated handle. The burner consists of a hollow casting J, adapted to drop into an



Chandler's (South Metropolitan Gas Company) Gas-Heated Iron.

opening at the back of the box, and of a tubular portion K (at the back), provided with holes for the admission of air. The gas nozzle, fitted into the end of the tubular portion, is secured by a screw or bayonet joint. It carries a flexible pipe L, the end of which is attached to a union within a conical sleeve, to prevent the pipe doubling so as to accidentally cut off the gas.

The air for supporting combustion enters through holes M. The top of the iron carries on its under side a plate of fire-resisting material N, and the bottom is furnished with a similar plate O. P are heat conductors fixed on to the metal of the box in advance of the plate O.

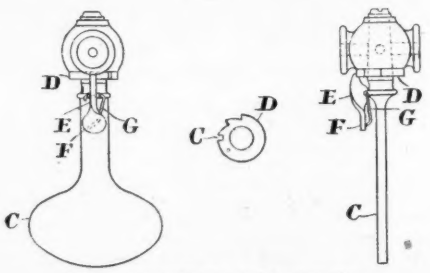
The flame issues into the space between the plates N and O, of refractory material, which serve to protect the metal from direct impingement and so prevent the top from becoming too hot. The products of combustion pass upwards through a gap in the plate N and escape through a covered opening Q in the top.

Safety Gas-Cock.

TOLHURST, J., and WAIT, A., of Mount Hamilton, Canada.

No. 14,265; June 18, 1912.

This safety device consists of a spring-controlled pawl or lever pivoted on the plug portion of the cock, one end of which is adapted normally to engage a notch on the cock casing when the gas is shut off, while the other end is formed with a thumb-piece upon which pressure must be exerted against the action of a spring to release the operative end of the lever from the notch on the cock casing before the plug is able to be turned.



Tolhurst and Wait's Safety Gas-Tap.

As shown, the plug portion of the cock contains a flat thumb-piece C, elongated far enough away from the operating parts to prevent the accidental use of the thumb-piece F. A ring D on the body portion is provided with ratchet teeth which permits a pivoted pawl to slip freely over some teeth when the plug is turned towards the "off" position. One of the teeth is at the "full on" position of the plug; another is cut at the point where the light goes out and before the plug has turned the full distance required to bring the thumb-piece C at right angles to the

gas-opening in the cock body—that is to say, before it is completely shut off; while there is also a notch to receive the pawl when the full one-quarter turn of the gas-valve is completed.

The latch or pawl E (with thumb attachment) receives a twist to bring the outer end of it into the proper position for a thumb-piece F to operate the pawl end. It is secured to the key C by a wire spring G, which is bent at the outer end and made to press upwards against the under side of the thumb-piece F, so as to keep the pawl in proper contact with the notched ring D. The spring thus has two uses—to retain the pawl and to keep it in engagement with the notches of the ratchet ring.

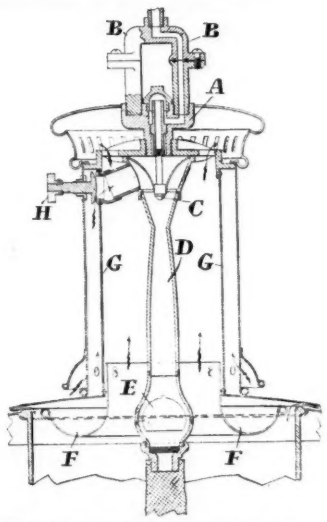
The patentees claim that while the device is quite easy to operate, it cannot be unlocked by accident. The gas may be turned off automatically without using the latch; and "one unacquainted with it may do so, but if wishing to turn the gas on again will be prevented by the latch."

Inverted Incandescent Gas-Lamp.

TILLEY, F. C., of Kingsland Road, N.E.

No. 9960; April 26, 1912.

As shown, the top plate, to which the major parts of the lamp are secured, is made with a series of projecting ribs or fins on the upper side reaching from an internally screw-threaded collar at the centre to a downwardly projecting rim near the outer edge, and having an outwardly projecting flange. Between the ribs which radiate from the centre are holes. On the underside of the top plate other projecting ribs or fins reach to about mid-distance between the rim and the collar. The object of the ribs is to prevent the plate buckling or cracking from the heat of the products of combustion.



Tilley's Inverted Incandescent Gas-Lamp.

To the screw-threaded collar is secured a socket A provided with arms, one of which is hollow and leads from the interior of the socket to a passage in a bridge-piece B connecting the two arms and the gas supply pipe. In the hollow interior of the socket is screwed a tube, the lower end of which carries the gas-nipple C, the upper end being of smaller diameter than the hollow of the socket and enclosed and covered by a cap screwed into the socket, the central portion of which is otherwise open.

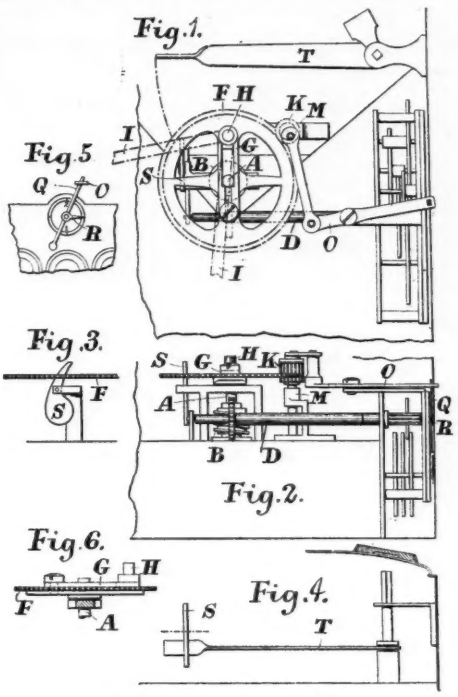
The gas-nipple is surrounded by a curtain fitting it tightly at its lower end and being held to the top plate or the mixing-tube; the curtain guiding the incoming air to the gas-nipple. From the underside of the top plate, and between the ribs, is suspended the mixing-tube D, formed conical at the upper part and having a bulb near the lower portion containing a diverter E, of spherical shape, for dividing the column of air and gas before it reaches the burner. There is a ring trough-shaped device F, acting as an inner reflector and secured with its inner wall projecting inside the tube G. At the upper part of the mixing-tube D, and above the outlet of the gas-nipple C, are air-tubes, leading to openings in the upper part of the tube G opening out into the space between the inner and outer tubes, each controlled by a valve whose stem projects outside, and can be operated by simply turning the handle H, so as to determine the air supply to the mixing-tube.

Testing Gas-Meters.

HUGHES, T., of Albion Road, Dalston, N.E.

No. 16,075; July 9, 1912.

The object of this invention is to facilitate the testing of gas-meters, more especially *in situ*, so that (in the words of the patentee) suspected unsoundness may be readily detected and also a leak on the consumer's side seen at a glance without having to watch for an hour or so for the ordinary registering mechanism to indicate the passage of a measurable quantity of gas. Leak-detectors which give an indication of passing gas more quickly than the ordinary registering mechanism have already been fitted to meters; but, so far as he is aware, no provision has been made for stopping the meter when *in situ* to test its soundness. His invention is "designed to provide a leak-detector so sensitive that it will not only indicate leaks in the pipes at a glance when no gas is being burnt, but likewise, by an abnormally slow movement, it will arouse the suspicion of the examiner as to the soundness of the meter itself when gas in quantity is being burned; the soundness of the meter being tested with certainty by providing means for stopping the meter without opening the cover so that the passage of unregistered gas may be seen by the behaviour of a flame at one of the burners."



Hughes's Meter-Testing Plant.

Fig. 1 is a plan; fig. 2, a side view; fig. 3, a side view detached, of the pawl which prevents the backward rotation of the crank-shaft and which can be fixed so as to stop the meter when required. Fig. 4 is a detached side view of a lever which can be turned by a key to block the meter stopping pawl; fig. 5 is a front view of the indicating hand; and fig 6 shows in detail an adjustable slide which carries the crank-pin to which the rod arms of the meter are attached.

A is the meter crank-shaft, having the ordinary worm B engaging the wheel on the shaft D, which drives the indicating mechanism in the usual manner. Upon the shaft A is keyed a toothed wheel F, on which is adjustably fitted a slide G carrying the crank-pin H. This pin engages with the ordinary rod arms I of the meter (indicated by broken lines). The slide G, which is slotted, is adjustable endwise to vary the throw of the crank as required, and is fixed by a screw. The wheel F measures with a pinion K, the spindle of which has a bearing in the bracket M. The pinion carries a crank-pin coupled by a link to a pin on the end of the lever O, so that as the pinion rotates the lever rocks. Q is an indicating hand mounted loosely on the arbor of units indicating-pointer R at right angles to the lever O, the end of which engages with the end of the hand Q, so that a rocking movement is imparted to the hand when the lever is rocked. Thus as the meter works and the shaft A is driven in the ordinary manner, the toothed wheel F will also rotate and reciprocate the indicating hand Q through the gearing and connections described, which are "such that the smallest movement of the crank-shaft gives an instantaneous and clearly visible movement to the hand Q."

To stop the wheel F, and also the rotation of the crank-shaft A, the ordinary pivoted check pawls is used. This pawl in ordinary meters prevents the meter working in a backward direction by projecting its nose into the path of the crank represented here by the arms of the wheel F. To convert the pivoted pawl S into a positive stop, a lever T is fixed on a squared pin which is accessible to a key through a hole in the casing (see fig. 4). The lever is turned by the pin so as to bear against the back of the pawl and prevent it yielding to the wheel F, even when driven in a forward direction. When the shaft A is held, no gas can pass by the valves; but should a burner continue alight after the valves are closed, unsoundness of the valves or diaphragms is at once shown.

Metropolitan Water Board's Assessments.—At the Kingston County Bench last week, the Metropolitan Water Board were summoned, at the instance of the Walton-on-Thames Urban District Council, for the non-payment of £665 19s. 6d., claimed as due on the current general district rate. The Magistrates made an order for the Board to pay £500 on account, and adjourned the summons pending the result of an appeal against the assessment.

Weald District Gas Company in Difficulties.—In the Chancery Division of the High Court of Justice last Friday, before Mr. Justice Neville, Mr. H. E. Wright moved for the appointment of a Receiver and Manager of the Weald District Gaslight, Coke, and Coal Supply Company. Mr. Wright said the plaintiff was the holder of a debenture for £240, which was payable in July of this year. There was evidence that the money was owing, and that it had been personally demanded at the registered offices of the Company. The urgency was that execution had been levied by the bailiff of the Tonbridge County Court. The Company were supplying gas to Burwash, in Sussex, so that there was a necessity for a Manager. His Lordship appointed the gentleman named in the petition.

CORRESPONDENCE.

[We are not responsible for opinions expressed by Correspondents.]

National Insurance Act, 1911—Decision No. 1072.

SIR,—With further reference to the correspondence sent you by Mr. Edwards, of Aldershot, regarding decision No. 1072 [see *ante*, p. 300], I have pleasure in stating that the Umpire has issued an "amended version" of the above decision, which now reads as follows:—

> "Contributions are payable in respect of workmen engaged in running gas-piping from a gas company's *service* in the basement of a block of tenements to the various rooms in the tenements."

This decision was, I understand, requested to meet the case of tenements where meters might be fixed in any part of the building.

Perhaps I might suggest that a workable rule in connection with this decision, in the case of a tenement, would be to consider the piping from the gas-main up to the inlet to the *first* meter "a service;" and from this point the piping would form part of the "carcassing," and so be included in work for which contributions are payable.

The confusion over this decision arose, no doubt, through the applicant using the word "main" when "service" was intended.

Glasgow, Oct. 30, 1912. ALEX. WILSON.

The Koppers Chamber Ovens at Vienna.

SIR,—There is a remarkable discrepancy in some figures shown in the interesting table of results obtained with the Kopper ovens at Vienna, as quoted in Mr. Cooper's article in the "JOURNAL" for the 22nd ult. (p. 284).

The calorific value of the gas per cubic foot, "at 59° Fahr. and 30 in. barometer," is said to be 612 B.Th.U.; but if the value be calculated from the analysis of the gas, employing Coste's figures ["Calorific Power of Gas," p. 66], and assuming, as is usual, the hydrocarbons to be equivalent to C_3H_6, it works out to only 547 B.Th.U. The difference is so great, and its bearing on the importance of the results obtained at Vienna so obvious, that it seems desirable some explanation should be forthcoming.

Nov. 1, 1912. J. T. S.

Heating-Up Retort-Settings.

SIR,—There is little need for me to reply to the withering communication which appears in the "JOURNAL" for the 29th ult., from a correspondent, "A. P." It is clearly the opinion of one who, unable to see beyond his own nose, must necessarily be scandalized at the views of those who, fortunately for themselves, are gifted with the power of longer sight.

Surely, no engineer who knows his business can possibly suppose that my article is intended to be the last word on heating-up retort-settings, and that no other practice is permissible. Probably, there are few matters upon which such a variety of opinion exists; and almost every individual has his own ideas as to the most effective means.

With regard to the custom of admitting a very small amount of secondary air to the producer during "slow-fires," this is quite a common practice; the idea being that a better draught is created, and that the steam from the new work is more easily expelled. The "disaster" "A. P." describes as inevitable exists in his imagination alone.

There are sundry pieces of "advice" in the communication; but the only other question which is sufficiently important to be worthy of further notice is that of adjusting the dampers for a temporary stop. "A. P." condemns the practice of closing the main dampers, and prefers to shuffle with his primary and secondary slides. What is the result? During normal working, his settings are under slight pressure or vacuum; and when he wishes to shut-down, the main dampers are left full open, whereas the air inlets are damped. Consequently, if the setting is working under a pressure, this immediately gives way to a vacuum; or, if the setting is normally working under a vacuum, the vacuum is increased. The result is that the gases take the path which offers the least resistance, and the retorts are subjected to severe local heating.

There is also the question of the composition of the gases. When "A. P." adjusts his slides for the stop, does he analyze the gases of each setting after doing so, or does he, too, take the path which offers the least resistance and put them where he *thinks* they should be—calling it "good enough"? By altering the main damper (as I propose), the quantity of gas is reduced, but its composition remains unaltered. Surely, the latter is the more scientific method?

Finally, I would suggest that, in the future, your correspondent should substantiate his theoretical conclusions with practical tests before rushing into print. And, in the event of his experimenting with my "dangerous" advice, I should be most pleased to hear of his experiences—should he survive to tell the tale.

Nov. 1, 1912. "ALMEA."

Mr. MacLaren's Address to the Scottish Junior Association.

SIR,—Absence in England on business prevented an earlier reply to Mr. Yates's letter noticed in the "JOURNAL" for the 22nd of October. As I wrote Messrs. Wright earlier in the year asking for information regarding gas-fires, I could not, in common courtesy, fail to acknowledge my indebtedness to them; and this I did by private letter and publicly at the conclusion of my remarks. This last was apparently not noted by the "JOURNAL" reporter.

My paper was composed of two portions—part, up to the headline "Testing of Fires" (p. 108, col. 1), being all my own, and the part thereafter culled from information supplied by Messrs. Wright and Co., and which was written mostly for the purpose of showing the members the practical application of the theories expounded and the experiments performed in the former part. This part was cut out in the "JOURNAL" report, while the latter part was published practically *in extenso*. The latter part *was not even read* at the meeting; and therefore any remarks made by one of the audience could apply only to the matter of the first part, which I claim was at least original. Perhaps it would have been better had the latter part of the paper not been sent up with the MS. to the "JOURNAL" for report.

Dumbarton, Oct. 30, 1912. F. L. MACLAREN.

PARLIAMENTARY INTELLIGENCE.

JOINT COMMITTEE ON GAS RESIDUAL PRODUCTS.

In the House of Commons yesterday, the Chairman of Ways and Means moved—"That the resolution of the House of the 5th of August, relative to gas authorities (residual products), which was ordered to be communicated to the Lords, and the message from the Lords of the 21st of October signifying their concurrence in the said resolution, be read; that a Select Committee of five members be appointed to join with a Committee to be appointed by the Lords to consider and report whether any, and, if any, what, restrictions should be imposed on gas authorities with respect to the purchase and manufacture of the residual products resulting from the manufacture of gas by other gas authorities, or of other chemicals; that a message be sent to the Lords to acquaint them therewith, and to request that their Lordships will be pleased to appoint an equal number of Lords to be joined with the members of this house; that Mr. Hills, Mr. Lardner, Mr. Walter Rea, Mr. Samuel Roberts, and Mr. George Thorne be members of the Committee; that the Committee have power to send for persons, papers, and records, and to hear parties interested by themselves, their counsel, agents, and witnesses if they think fit; and that three be the quorum of the Committee." The motion was agreed to.

Further Progress of Bills.

During the past week, the Gas Orders Confirmation (No. 1) Bill [Lords], which had been re-committed, was reported with amendments [Provisional Orders confirmed]; and the Gas Orders Confirmation (No. 2) Bill [Lords] was read the third time and passed.

The Public Health (Acquisition of Water) Bill, an epitome of which is given below, stood second on the Orders of the Day for second reading on Friday last; but eight notices of motions for its rejection had been given. Two of these were, however, withdrawn; and yesterday the Bill was No. 11 on the Orders.

GAS ORDERS CONFIRMATION (No. 1) BILL.

A Concession in the Thurles Gas Order.

This Bill, confirming Provisional Orders relating to Conisbrough, Elham Valley, Knottingley, and Thurles, and which had been re-committed by the House of Commons, again came before an Unopposed Bills Committee, presided over by Mr. WHITLEY, last Thursday.

The re-committal took place in respect of the Thurles Order. Almost up to the point of the third reading, the Order had been an agreed one between the Thurles Gas Company and the local authority; but to obtain further amendments, the latter, more or less suddenly, blocked the third reading. In order to remove this opposition, the Company agreed to reduce the previously-agreed maximum price of 5s. 7d. to 5s. 4d.; and it was the character of the amendment which necessitated the Bill being sent back to the Committee. The amendment was passed by the Committee, and the Bill sent forward for third reading.

LOCAL AUTHORITIES AND WATER ACQUISITION.

A Departmental Bill.

Early in July last, a Bill was introduced by Mr. Herbert Lewis, the Parliamentary Secretary of the Local Government Board, to enable the Board, by Provisional Order, to give powers to local authorities for the purpose of the acquisition of water. The Bill was then ordered to be printed; but it was not issued till a few days ago. It contains practically only one clause, of which the following is an epitome.

The Board may by Provisional Order authorize a local authority, for the purpose of the acquisition of water, to abstract water from any river, stream, or lake; and a Provisional Order may be made notwithstanding anything contained in sections 327 and 332 of the Public Health Act, 1875. Provision is to be made for compensation being given in respect of the abstraction of water under the Order. If practicable, it is to be by means of the supply of a flow of water; but if not, in such manner, either by means of a payment of money or otherwise, as the Order directs. Local authorities intending to apply to the Board for Orders are, at least four weeks before making the application, to publish in the "London Gazette" and in some local newspaper circulating in their district an advertisement describing shortly the nature of the proposed undertaking; and also serve such notices as are required by the schedule to the Act; but the Board may dispense with the service of any notice so required, either unconditionally or upon such conditions as to the service of other notices or the publication of advertisements or otherwise as they think fit—due care being taken to prevent the interest of any person being prejudiced by reason of the service of notice being so dispensed with. Section 297 of the Public

Health Act, 1875 (which relates to Provisional Orders made by the Local Government Board), is to apply to any Order under the Act.

Where the Board cause any local inquiry to be held for the purpose of an Order, the costs incurred, including the salary of any inspector or officer of the Board engaged, not exceeding three guineas a day, are to be paid by the local authority applying for the Order. The Board may certify the amount of the costs; and any sum so certified and directed by the Board to be paid by any authority is to be a debt to the Crown from that authority. A Provisional Order made under the Act may provide for all matters which appear to the Board to be necessary or proper for bringing into operation and giving full effect to the Order.

For the purposes of the Act, the expression "local authority" means the council of any county borough or borough and any urban or rural district council. Its short title is the "Public Health (Acquisition of Water) Act, 1912;" and it is to be read as one with the Public Health Acts. It does not extend to Scotland or Ireland.

The following are the forms of notices to be served under the Act:

1.—Where it is proposed to abstract water from any river, stream, or lake, notice shall be given to any owners or reputed owners and lessees or reputed lessees of any mills, manufactories, or other works using water at any place within the limits defined in this schedule, and to any persons taking water for the supply of a canal or navigation authorized or regulated by Act of Parliament at any place within the limits so defined, and to any Board of Conservators established under the Salmon and Fresh Water Fisheries Acts, 1861 to 1907, whose district or any part of whose district is within the limits so defined.

2.—For the purposes of this schedule, the defined limits shall be, in a case where it is proposed to abstract water from any river or stream, the river or stream from the point at which the water is proposed to be abstracted to a point twenty miles distant down the river or stream; and in a case where it is proposed to abstract water from any lake, the area of the lake and any river or stream flowing out of the lake from the point where the river or stream so flows out of the lake, to a point twenty miles distant down the river or stream: Provided that, if the waters of the river or stream fall into or unite with any navigable river or stream within a less distance than twenty miles below the point at which the water is proposed to be abstracted, or the point where the river or stream flows out of the lake, as the case may be, the distance between that point and the point at which the waters fall into, or unite with, the navigable river or stream shall, unless the Local Government Board otherwise direct, be substituted for the distance of twenty miles. For the purpose of this provision, distance shall be measured along the course of the river or stream.

3.—A notice under the foregoing provisions shall be in writing, and shall state the name (if any) by which the river, stream, or lake is known at the point where the water is proposed to be abstracted, and the parish in which that point is situate; also the place where the plan of the undertaking may be seen, and the name of the local newspaper in which the advertisement relating to the undertaking has been published.

LEGAL INTELLIGENCE.

GAS COMPANY'S RIGHT TO LAY MAINS.

The Worthing Case Decided in Favour of the Company.

In the Chancery Division of the High Court of Justice last Tuesday, Mr. Justice EVE had before him the case of *Schweder v. Worthing Gaslight and Coke Company*, the question raised in which, it may be remembered, was the right of the defendants to lay a main. His Lordship had previously had the matter before him, as fully reported in the "JOURNAL," Vol. CXVI., pp. 327, 399, 856. The facts may be briefly recapitulated.

In 1907, the defendant Company, whose manufacturing plant is situate in Worthing, found it necessary to obtain parliamentary powers for the acquisition of land outside the town whereon to erect additional works. By the Act they were authorized to acquire land for this purpose, and, by section 7, to lay down gas pipes and mains in the parish of Goring, for the purpose of connecting the new works with those in Worthing. They were further authorized to exercise the powers of the Gas-Works Clauses Act, 1847, for the purpose of opening streets to lay their mains. In order to link-up the works, they proceeded to lay a pipe under a lane, the soil of which was vested in the plaintiff, and which, in fact, ran so as to divide into two parts the ground of which he was the owner. The work was commenced, but before it was completed the plaintiff so far forestalled the Company as to interpose between the two ends of their pipe a tunnel through which they were unable to go. They therefore endeavoured to pass over the roof; but, owing to a mistake on the part of the contractors, they were unsuccessful, as instead of going over they went through a portion of the tunnel. Plaintiff then brought an action claiming a mandatory injunction for the removal of the pipe, on the ground that it was "in, through, or against a building." The case was tried by his Lordship in October last year; and, after hearing the evidence of two independent gentlemen who were sent down to investigate what had really been done, the Court held that the mains did, in fact, pass through a portion of the tunnel; and as this was a "building" within the meaning of the Act of 1847, the relief claimed was granted. The result was that the defendants were placed in this difficulty: They could not leave the pipes where they were, and as the soil left above the roof of the tunnel was somewhat shallow, having regard to the traffic passing over the road, they had to consider how best they could link-up the ends of their main by joining them across the top of the tunnel—a distance of some 8 or 10 feet. The plan adopted was one which did not involve any touching, entering upon, or interfering with the plaintiff's "building," as it consisted of making substantial concrete beds at each end, and including therein rectangular cases through which the gas was transmitted. Plaintiff now took exception to this—alleging that the carrying-out of the project was in breach of the statutory provisions in favour of the landowner in section 7, inasmuch as it involved a trespass by the Gas Company upon land not dedicated to the public use. The Company, on the other hand, contended that this construction would not involve any *ultra vires* act on their part, and that the plaintiff had no ground for the present action.

Mr. P. OGDEN LAWRENCE, K.C., and Mr. BRYAN FARRER appeared for the plaintiff; Mr. MACMORRAN, K.C., and Mr. COZENS HARDY, K.C., represented the defendants.

Mr. Justice EVE said the material facts were all either proved or admitted. It was not disputed that Goring Lane was a street dedicated to the public, that the soil of the road was vested in the plaintiff, and that the control of the road was in the East Preston Rural District Council. The dedication as between the public and the road authority on the one hand and the owner of the soil on the other involved something more than the dedication to the public of the occupation of the surface. It involved a dedication of so much of the soil of the roadway as was necessary for the control and maintenance of the road or street as a road or street. This must be a matter of evidence in each case. It might be that the subsoil was of such a nature that very little was necessary for these purposes, or, on the other hand, that it was of such a character that a far greater depth was needed. But in this case he was not met with any question of fact, as the parties were agreed that, regard being had to the nature of the subsoil and the class of traffic to which the road was subjected, 18 inches was the fair quantity of the soil dedicated for the purposes of the road, and necessary for its maintenance. The question whether the soil at a greater depth than 18 inches was dedicated to the public use was only susceptible of one answer—namely, in the negative. The very fact that the parties were agreed that 18 inches was all that was required for the maintenance of the street or road precluded the public or the road authority from asserting that there had been any dedication of the soil below that depth, inasmuch as it was not required for road purposes. The defendants contended that, in approaching the consideration of section 7, regard must be had to the section upon which it was a limitation. It was not disputed that, if section 6 stood alone, what the Company proposed to do was amply justified by the terms used. By section 7, a limitation was placed upon the powers conferred by the preceding section—"nothing in the Act shall authorize the undertakers to lay down any pipe in any land not dedicated to the public use." This in each case made it incumbent upon a gas or water company to ascertain exactly how much of the soil of the street of which the surface was dedicated to the use of the public was necessary for the maintenance of the street as a street, and limited their statutory powers to lay a pipe there to so much as might be ascertained to be necessary. This was what the plaintiff contended was the true effect of section 7. On the other hand, the defendants submitted that due regard must be had to the subject-matter of the sections, and that the true limitation imposed by section 7 on the powers conferred by section 6 was that "street" must be held to be any public place, highway, square, court, or alley; and that the true limitation was not to be found in the *quantum* of the soil of the particular road dedicated for road purposes, but as between road which was not and road which was dedicated for public use. This was the whole point in the case. The conclusion to which he had arrived was that the contention of the defendants was correct. The fact that the road had been dedicated to public use brought it within section 6, and not within the limitation imposed by section 7. The action would therefore be dismissed, with costs.

PROJECTING ILLUMINATED SIGNS AND LAMPS.

The Brighton Appeal.

At a Special Sitting of the Brighton Quarter Sessions on Friday, the RECORDER (Mr. W. P. G. Boxall) gave his considered judgment in the appeal by Clark's Bread Company, Limited, against the Brighton Corporation, on the subject of projecting shop signs. The proceedings at the hearing of the case were reported in the "JOURNAL" for the 22nd ult. (p. 301). Briefly, the facts were that the Corporation served notices on the firm to remove certain lamps on which appeared their name over the pavement fronting their business premises in London Road and North Street. These the Company refused to comply with, on the ground that the action of the Corporation was illegal. The notices having expired, the lamps were removed by instruction of the Corporation; and the Company entered an appeal.

In the course of his judgment, the Recorder said that the appellants, being aggrieved by the action of the Corporation in removing five globe incandescent lamps and brackets with advertisements on them, fixed outside their London Road shop, on the ground that they were a public nuisance by reason of their projecting into the street, had appealed; their contention being that they were not a public nuisance by reason of their projecting within the meaning of the Act passed in 1825 for the better regulation and improving of the town, and also of the Local Government Supplemental Act of 1861. It was admitted, and proved, that the Company placed the projecting lamps complained of outside their shop windows some four years ago, and that they had had no complaint of annoyance or nuisance in reference to them until the matters in this case arose. It was also admitted that the brackets and lamps were not a source of danger to the public, that they were well-fixed and sufficiently strong for their purpose, that the extreme horizontal projection was 2 ft. 9 in. from the front of the windows, that the bottom of each lamp was 6 ft. 11 in. above the pavement, and that the word "Clark" was burnt into the glass of the globe in plain brown letters $1\frac{3}{4}$ inches in height. It was also admitted that notices were only served by the Council in respect of lamps with advertisements on them; and that if the word "Clark" were removed from the lamps, no further steps would be taken. At a general meeting of the Improvements and Buildings Committee on June 25 last, a report of the

Borough Surveyor was presented, submitting a list of sixty signs projecting over, and encroaching upon, the public footway in London Road, and giving the situation, description, height, and size of the sign in each case. In all, with one exception (that of a show case), they had as part of the description the words "with advertisement." The five lamps in question were included in this list. It was on that day and, so far as he had any evidence, on that material alone, resolved that, in the judgment of the Council, the several signs were public annoyances and nuisances by reason of their projection, and annoying the public passage along the streets; that notice should be given to the occupiers of the several premises to remove them within fourteen days; and also that, in the event of the notice not being complied with, the signs should be removed by the Borough Surveyor on behalf of the Council, and the costs recovered in the manner directed by the Corporation Acts. The proceedings of the Committee were subsequently approved by the Council; and on July 15 a notice was served on the appellants to take the lamps down within fourteen days. The appellants did not comply with the notice, and the lamps were subsequently removed by the Corporation. It was from this judgment and act of the Council that the Company appealed. The Corporation contended that their action was lawful by reason of the powers conferred upon them under section 76 of the Act; but they took the preliminary objection that there was no right of appeal from their judgment. It was admitted that there was no appeal from the judgment or act complained of, unless it was contained in section 256 of the Act, and also that if an appeal lay under this section it must be to the Borough Recorder. In his opinion, there was a right of appeal against the act complained of. Section 76, on which the respondents relied, seemed to deal with projections and obstructions which the Corporation might hold to be public annoyances or nuisances by reason of their projecting into, encroaching upon, or otherwise annoying or endangering the public passage, which he took to mean the passage of the public along any street. He could conceive cases where a lamp projecting into the street might, with lettering on it, annoy or endanger the passage of the public in the street, by casting dazzling contrasts of bright light and deep shadow over the street. He invited evidence of such annoyance. None was given by the respondents; but the appellants gave evidence that during the four years the lettering had been up there had been no complaint, and that there was, in fact, no annoyance or nuisance whatever. It was in substance admitted that the respondents claimed to treat all lamps with lettering, projecting into streets, as an annoyance within the section, whether they did or did not in fact constitute any physical inconvenience to the passage of the public through the street. It was further contended that the section did not deal with projections which were public nuisances or annoyances, but which, in the judgment of the respondents, might be so considered; and that the respondents' judgment on the point could not be questioned. Among other things, he had to determine whether the Corporation were empowered to remove the lamps solely because they had the word "Clark" upon them. The Corporation might be well advised that it would be beneficial to the town if all letters and advertisements on projecting lamps were prohibited; but he had to consider the objection of the appellants to the legality of the order for the removal of these lamps. With regard to the contention of the respondents that they had power to deal with any projection that might be undesirable, though in no way annoying or endangering the passage of the public along the street, he did not think the section gave so wide a power. There must be something which interfered with the passage of the public along the street. He thought the Act of 1825 enabled the respondents to deal with projections which actually affected the passage of the public through the street; but it did not enable them to remove a projection merely because it might be an annoyance to the public from an æsthetic point of view. The resolution of the Council was admittedly only passed on the assumption, and in the belief, that the section empowered them to remove any objection that had writing upon it, and was not in reality a finding in the exercise of their discretion that the lamps in question annoyed or endangered the public passage along London Road. He held that the removal of these lamps was not authorized by the provisions of section 76 of the Brighton Improvement Act, 1825; and he allowed the appeal, with costs. There was a second appeal in reference to the Company's North Street shop. The same result followed.

On the application of the Corporation, the Recorder consented to state a case on the points of whether there was an appeal to him, whether his decision was final, and whether the judgment of the Corporation was in itself final.

Selling Gas-Mantles under False Pretences.

At the West London Police Court on the 26th ult., before Mr. Fordham, Gordon Busserau, described as a traveller, and Percy Classing, a gas-fitter, were charged, on remand, with conspiring to obtain money by false pretences. Mr. E. W. Isaac prosecuted on behalf of the Gaslight and Coke Company; Mr. Engelbach, barrister, appeared for Busserau. The evidence showed that for some time the prisoners had been going about selling gas-mantles on the pretence that they came from the Company, who, they represented, were desirous of putting a new mantle on the market. The boxes in which the mantles were packed were stamped with the Company's name, and the invoice which was delivered to each customer also bore the same stamp. Evidence was given at the previous hearing [*ante*, p. 302] that the mantles did not belong to the Company, and that they were worthless. Mr. Engelbach, for the defence, stated that the accused pleaded guilty to the charge of false pretences; and he wished to point out that they had both been fined at Sutton on a similar charge. Detective-Sergeant Hedley observed that, as a matter of fact, Busserau was dealing in mantles as late as the 5th of October, and Classing as late as Sept. 23—two months after the Sutton conviction. He called into the witness-box the man from whom the defendants purchased the mantles, who declared that these were perfectly good so long as they were not handled before being used. Mr. Fordham remarked that the prisoners knew that by using the name of a Company with the high reputation of the Gaslight and Coke Company they were giving the goods they sold the best recommendation possible. It was a clear case of false pretences; and he sentenced the prisoners to one month's hard labour.

MISCELLANEOUS NEWS.

GAS COMPANIES' PROTECTION ASSOCIATION.

The Annual General Meeting of the Association was held last Thursday, at the Westminster Palace Hotel, Victoria Street, S.W.—Mr. H. E. JONES in the chair.

The following names were taken from the register of those in attendance: Mr. H. E. Jones (Chairman), Mr. Arthur Easton (Faversham), Mr. Chas. W. Braine (Wandsworth), Mr. Henry Hart (Canterbury), Mr. W. A. Schultz (Ascot), Mr. Chas. E. Botley (Hastings), Mr. W. Belton (Shrewsbury), Mr. E. A. Browne (Draycott), Mr. Alfred W. Oke (Southampton), Mr. D. H. Helps (Reading), Mr. T. H. Hazell (Newport, Mon.), Mr. R. O. Paterson (Cheltenham), Mr. J. Marshall (Long Eaton), Mr. Edward Allen (Liverpool), Mr. Frank Livesey (Maidstone), Mr. Thomas Berridge (Leamington), Mr. R. Bruce Anderson (Waterford), Mr. George Stevenson (Long Eaton), Mr. Stanley C. Sherrard (Kingston-on-Thames), Mr. J. R. H. Jacobs (Southampton), Col. H. Oakden Fisher (Cardiff), Mr. George Clarry (Cardiff), Mr. W. R. Phillips (Hitchin), Mr. B. R. Green (Mitcham), Mr. W. B. Farquhar (Ilford), Mr. G. H. S. Iorns (Ilford), Mr. W. W. Topley (Croydon), Mr. T. H. Duxbury (South Shields), Mr. W. E. Vinson (Gloucester), Mr. R. W. Edwards (Aldershot), Mr. E. H. Wix (Faversham), and Mr. W. Mann (Brentford).

The SECRETARY (Mr. Fred. E. Cooper) read the notice convening the meeting and the minutes of the last meeting; and the Committee's report—which was given in the "JOURNAL" for Oct. 22, p. 303—was taken as read. He mentioned that he had received intimations of regret at inability to attend the meeting from Mr. George Andrews, Mr. Frank Bush, and Mr. S. Y. Shoubridge.

THE ASSOCIATION AS A WATCH-DOG.

The CHAIRMAN pointed out that the Committee had kept a promise made that the members should be furnished with the accounts and the report before the meeting. Matters had been set out at length, and all had had an opportunity of studying them. Those who had formed any conclusions, or who wished to ask any questions, he would be pleased to hear when the formal resolution had been moved and seconded. It would be seen from the report that during the past year the Committee had quite fulfilled their mission of being a watch-dog to look after the interests of the members of the Association in all matters of legal and parliamentary importance. They had been so much of a watch-dog, that he might say the Secretary had been in communication with him so frequently that practically they had for some period to live more together than—much as they liked each other—was congenial to them or favourable to the transaction of their other business. It had been a very, very busy year. From the first paragraph of the report, they would see that there was a small adverse balance of £92. But then he would remind them that the accounts contained the payment for the resisting of a steam-roller clause in the previous session, as well as for the two considerable contests before Parliamentary Committees referred to in the report. So that if they took these three fights into account—and parliamentary fights were not cheap, and were rather tedious—he thought they would be satisfied that in depleting as had been done the balance which had been accumulated for the special purpose of protecting the interests of the members, they were only fulfilling their mission. Therefore he did not expect very much adverse criticism on this point.

ELECTRIC LIGHTING ACTS.

It now became his duty to give them some particulars as to what the Committee had been doing during the past year; and in connection with this it would be seen that the report gave some indication as to how they had been engaged. They had first of all to endeavour to see the President of the Local Government Board, on the question of the way in which the electric light undertakings—especially municipal ones—kept their accounts, and, in competition with gas undertakings, made losses which they afterwards charged to gas suppliers, among others, through the rates. They were, however, unable to prevail upon the President of the Local Government Board to give them a hearing on this subject.

TRADES DISPUTES ACT.

Then, again, he signed, on behalf of the Association, a memorial to the Prime Minister with reference to the Trades Disputes Act. In addition to their Association, this was signed by nearly every representative organization in the kingdom having anything to do with labour, with a view to pointing out the effects of allowing an extreme liberty to people not only to quarrel with their own bread and butter, but to quarrel with their brothers and friends, and prevent them from obtaining their bread and butter either. But the memorialists were not successful, even in this matter, in getting a hearing from the Prime Minister.

ELECTRIC WIRING BILL.

Then they had to consider the Bill promoted by the National Electric Construction Company, and they gave notice of opposition to it. As this was, in the opinion of the Committee, a matter of great importance to gas undertakings, they were prepared really to make a fight for it. But the Association's Parliamentary Agent, in negotiation with the Agent for the Bill, was able to get a clause inserted for the protection of the gas companies affected, and to limit the operation of the Bill to what actually had been done, and not to include what in the future might be done. It was true that the suggestion that local authorities should put in wiring and fittings at a small quarterly charge upon the service corresponded with what they, as gas companies, claimed, and rightly claimed, that they should do with the coin-meter system, which was a boon to everybody. But the gas companies did it at the shareholders' risk, and not at the risk of the ratepayers.

DEPRECIATION AND INCOME-TAX.

The next matter referred to in the report—and in connection with this he was pleased to see an able advocate, in the person of Mr. W. A. Schultz, was with them that day—was as to the propriety (which was

disputed recently by the Income-Tax Authorities) of charging depreciation for income-tax purposes on such things especially as stoves and meters, and incidentally on gasholders and other parts of their plant. These things, of course, they knew must depreciate; and if they did not anticipate this by establishing a fund, they found themselves some day with a very large outlay before them, and a great hole in their capital account. Such a strong position as they occupied could not be resisted; and when the authorities had heard Mr. Schultz and Mr. Cash on this subject, they at once quitted the ground they had taken up—which was that gas companies should only be allowed to take into consideration money actually spent in the directions referred to in the account year, instead of permitting them, like wise and prudent people, to put by annually a sum which would represent the infallible depreciation slowly going on. The result they all knew; and he thought the Committee might claim some credit for initiating and organizing opposition to the attitude of the authorities. Though when the time came there was another representative Committee formed among the leading gas companies, who did actually carry out the negotiations, he might tell them that the Association were paid a compliment by the Inland Revenue authorities, who said that they must have the acquiescence of the Gas Companies' Protection Association in the settlement. This, he thought, coming from such a source, showed that they were recognized by those in authority as having a distinct power and privilege to speak on behalf of the industry. This settlement allowed the full 10 per cent. depreciation on meters and stoves, and ephemeral things like them, and also 3 per cent. on gasholders. This, of course, was a very liberal and a very proper settlement. The argument had been advanced that this principle might be carried through the whole plant of a gas company. But inasmuch as they did, with regard to other parts of the plant, more frequently renew and replace them as they became outgrown, perhaps the matter was less pressing than in connection with such apparatus as gasholders, which only fell into decay once in forty years or more.

RESIDUALS CLAUSES.

The Committee had also had to take up a strong position, and to assist with funds the opposition, in connection with the proposal of Parliament to limit the rights of gas companies to deal in residual products. Now, for many years Bills had been passed quite freely by Parliament, who had encouraged companies to make the best they could of their residuals, because under the sliding-scale, which was by this time almost universal, any benefit they could derive in this way went in large part to the consumers of gas. It was a wise principle that they should be allowed to deal in these things. The language in the Acts passed for many years was that they should "deal in;" and this meant that they should buy as well as sell. But owing to the fact that some of them near London had been helping themselves to much cheaper sulphuric acid, the sulphuric acid makers—for this was what it came to, as they called themselves alkali manufacturers, but it was sulphuric acid really—got very jealous about it; and they were specially annoyed by some recent contracts in London, when they failed to secure the business. Without anything like making a case in public, or bringing in an Act of Parliament, or taking any step which would have forewarned the gas people, the gas companies having Bills in Parliament (it happened that the South Suburban Amalgamation Bill was one and the Annfield Plain Gas Bill another) found themselves suddenly confronted by the Chairmen of Committees—one Lords and the other Commons—with the statement that they must accept limitation of the powers they had previously enjoyed. There was not the slightest warning of this. Some very vaguely worded petitions had been lodged, but they by no means suggested that there was such a serious matter to be met. They found, however, that the proposals seemed to be accepted by the Committees as a matter of course; and, indeed, in the case of the Wandsworth Bill, the Chairman said before it came before the Committee that he was going to have this clause put in, willy nilly. He appeared quite determined in his own mind that there was nothing else to be done. The rights and wrongs of the matter were just this: That Parliament appeared to have been in this matter informed by some process—he would not call it a back-stairs process, but the Committees they met seemed to have formed a view of the matter the gas companies were not at all prepared for. Basing themselves on the operation of the sliding-scale, which gave so large a share of their economies to the consumers of gas, the companies thought the course was clear. But it was not so. It appeared to have been borne in upon the minds of many Members of Parliament that, inasmuch as gas companies had been forbidden to make stoves, and gas-engines, and appliances of this sort—they might sell, let, repair, or maintain them, but must not manufacture them—it had been laid down by Parliament that such companies were to be restricted as much as possible to manufacturing and selling their own particular products—gas, coke, tar, and so on. This might be according to some views a proper proposition; but, if so, it was a great pity that it was not enunciated before Parliament gave them authority years ago to deal in the things in question, and before many of them had, depending upon this authority, put up plant (as he himself had done in connection with the Commercial Gas Company) for making sulphuric acid, and various things of this sort. At the present moment, he had in his mind two or three cases in which the clause would result rather in hardship to the districts in which they operated than to the companies concerned. He knew a company who, because they could not sell to another gas company oxide of iron saturated with sulphur, must take a very low price for it and pay a very high price for sulphuric acid, or must put up a sulphuric acid plant of their own—and this perhaps in a neighbourhood where it was undesirable to have a sulphuric acid plant running. Then, again, he had in his practice cases of companies so far afield, and so far from the sulphuric acid or ammonia manufacturers, that they could not possibly deal with their ammoniacal liquor, which was very bulky. A ton of ammoniacal liquor well saturated would give a hundredweight of sulphate of ammonia; but if they had to cart it about, and had to pay expenses on a ton to get back a hundred-weight, there was a loss of value. These small companies were therefore driven to this position—that if they could not get a company close by on a larger scale to take this stuff from them, they would have to send it perhaps a hundred miles to the manufacturer; or, if they did not do this (they might in some cases almost incur a loss by it), they must—and this was an injury to the district—dispose of the material, which was very deleterious, in some manner to prevent a nuisance in the place. And it was a substance that might cause considerable nuisance. It was unnecessary for him to go further into this matter, because those present knew what it meant—possibly something serious for the district. Therefore this clause must be resisted.

THE PROPOSED INQUIRY.

They had been to the Lord Chairman and the Chairman of Committees; and they elicited a promise at one time that the Model Bill should not be in any way varied until they had had the parliamentary inquiry which they had moved for—that was, a Joint Committee to inquire into the whole subject in its general bearing and relations, and not as referring specially to any particular company. They were told—and he was disappointed that it had not been adhered to—that until this Committee had reported, there should not be any variation in the Model Bill. But the Model Bill now contained certain words attached to the clause enabling them to manufacture residuals. The simple words "by them" were added to the tail of the clause, which meant that they could only manufacture and deal in the residuals manufactured by themselves. This on a small scale was absurd. They could not do it. As he had said, however, their persistent efforts had led to something. They were associated in these efforts with a Committee specially sent to help them from the Institution of Gas Engineers, who felt very deeply on the subject, and devoted considerable time—and, he believed, money—to this question of opposition. They succeeded in getting, at any rate, a promise that there should be a Committee, which was technically called, he supposed, a Joint Committee of both Houses, to which, at the date of the report, the House of Commons had assented, and to which the House of Lords had since agreed This was a very vital matter; and it proved how constantly the Committee of the Association had to be on the watch—how constantly they had to make efforts in the protection of the interests of the members. What would be the outcome, they did not know; but Mr. Corbet Woodall, the President this year of the Institution of Gas Engineers, was giving the matter his close attention, and there was to be a meeting at his office within a few days of the Committee of this Association and the Committee of the Institution of Gas Engineers to deal with the subject. With Mr. Corbet Woodall's influence, and the amount of weight that he could with his large Company throw into the scale, it was to be hoped that he would give evidence, and they would have a very strong case to put before the Committee. He sincerely trusted that it would be a strong, and yet moderate, case, because if they failed to get a verdict he thought it would perhaps be unfortunate for them. In this connection, he was reminded by the Secretary that it would be well, if any gentlemen present had suggestions to offer regarding the inquiry, that they should state them or communicate in writing with their Parliamentary Agents, Messrs. Cooper and Sons. But they must be well-considered suggestions. In relation to this, he might mention that the Institution of Gas Engineers issued a large number of circulars of inquiry, and had the answers filed away—showing what number of companies were manufacturing sulphuric acid, and what number were purchasing from other companies. Therefore, a good deal of the work had been done.

NATIONAL INSURANCE ACT.

The Committee's labours did not end here, because they had been watching continually the Advisory Committee under the National Insurance Act. They had to pay the fees for their men, and also the employment insurance fees, and this was not quite so simple as health. It became a great question which classes of men should come under the extra 5d. per week for employment insurance.

Mr. EDWARD ALLEN (Liverpool): Unemployment insurance.

The CHAIRMAN said it was insurance of employment or compensation. They appointed a Special Committee to appear before the Umpire and adjust these matters; and with the assistance of gentlemen like Mr. Alex. Wilson (of Glasgow), Mr. D. Milne Watson (of the Gaslight and Coke Company), Mr. Charles Carpenter (of the South Metropolitan Company), Mr. Edward Allen (of Liverpool), Mr. George Clarry (of Cardiff), and others, they succeeded, he thought, in impressing the Umpire with the real truth of the matter—which was that practically very few men employed in the constructional department were ever put out of a job at all. At any rate, they very much reduced the effect which the Act might otherwise have had upon them.

CENSUS OF PRODUCTION OFFICE.

As to the Census of Production Office, they received a communication inviting them to send comments or suggestions for the improvement of the specimen schedules; and Mr. Carpenter went fully into the matter on behalf of the Committee, and made various suggestions for alterations in the schedules, which were duly forwarded to the Comptroller-General.

QUESTIONS ANSWERED BY THE SECRETARY.

The members had in the report a list of numerous questions in connection with which the Association had been the source of information and advice to subscribers. It was a very long list. He would not read the items; but over thirty different subjects were discussed between the Secretary and the members. They had carefully considered the matter, and came to the conclusion that it was inexpedient that the answers should be published, because in that case outsiders would get the benefit of the Secretary's advice, which was not altogether desirable. Then, again, some cases might be slightly varied in different respects, and a mere printing of the facts might not altogether lead to an accurate apprehension of the points in a case that might be very nearly on all-fours with them, but not quite. Further, they had to consider Mr. Cooper, who was venturing his professional opinion in these matters, and this opinion need not be thrown exactly to the winds.

THE ACCOUNTS.

This brought him to the end of his long story; and he would now deal with the accounts. The expenditure was £666, and the income was £574. But there was included in this year's expenditure £150 spent in

two necessary parliamentary contests on the Alkali Manufacturers' clause, and a contribution of £122 to the cost of resisting a steam-roller clause; so that the small adverse balance of £92 was, he thought, very satisfactory, and he would not attempt to apologize for it. The Association existed for the purpose of protecting the interests of the members; and they must spend a little money in doing so. They were very careful. Then there was £1522 in Consols—this was figured at the purchase price.

The SECRETARY: At the next Committee meeting, they are going to consider the advisability of writing it down.

The CHAIRMAN: I think we must wait for a more favourable time before we do this. He then concluded by moving the adoption of the report and accounts.

Alderman HART (Canterbury), in seconding the motion, said he thought the Committee, and the Chairman particularly, had done great work during the past year, and deserved much credit from all the gas companies for their zeal and exertions in serving the interests of the Association. He was sorry to see the deficiency in the accounts; but they could hardly have expected otherwise with so much work being done. It was gratifying that four or five more gas companies had joined the Association. This would further strengthen them in the future.

THE LATE COAL STRIKE.

The Chairman had not alluded to the great coal strike; but it was worth while to mention it, and the action that was taken by most of the gas companies. Through their amalgamation, or union, they became aware more than twelve months ago that a strike was in front of them, and most companies took care to have a good supply of coals in their yards to meet it, A few, however, who were not members of the Association were in the background. A town in proximity to his own city did not know that this great strike was coming; and their stocks were so reduced that they had to give a very high price for coals during the strike. On the other hand, those in the secret, who knew the strike would take place, as he had said, had their yards well filled with coals; and this was owing to their union. They were associated together for one great purpose—the prosperity of each and every one of the companies. He felt that the Chairman had shown that afternoon that the Association was of very great benefit, and that it existed for the good of the whole of the gas community. There was one point in the balance-sheet to which he would like to refer. Among the assets they found "Balance brought from revenue account £92." This might look like an asset; but the assets were really £2151, and not £2243. He thought that the £92 should appear in a different form. At any rate, it seemed to him that it should not be under the head of assets.

Mr. E. A. BROWNE (Draycott) remarked that, as the representative of a small gas company, he could not leave the room without placing on record his appreciation of the great amount of work done for the industry, and especially for the small gas companies. He agreed with what had been said as to the balance-sheet.

The CHAIRMAN: So do we.

CONSULTING THE ASSOCIATION—THE STEAM-ROLLER.

Mr. R. W. EDWARDS (Aldershot), referring to the list of matters given in the report on which the Secretary had been consulted, said this not only served to show the value of the Association, but it rather indicated that occasion was taken sometimes to discuss items which one would scarcely think would come within the purview of such an organization. He suggested to the subscribers, with all respect, that they should not worry the Association with trifling matters, and that by intelligent reference to standard works they would find answers to a good many of the questions put. [Hear, hear.] At the last meeting, he raised the question of depreciation in a very humble way, and others had also felt that the time had arrived when some representative action should be taken with the Inland Revenue Authorities. Though it was possible that what had been secured might not have met with universal approval, it might be taken as a good sign. The chemical clause question was one that he was much interested in. It would hit some of the smaller companies, because it would prevent other companies from taking from them the liquid products which they could not so advantageously dispose of themselves. In connection with one point, the Chairman had not done himself justice. He felt sure he could have told them something about his experience regarding the steam-roller precedent, a portion of the cost of resisting which appeared in the accounts. Last year, he (the speaker) mentioned, in relation to the steam-roller question, his own experience two or three years ago in Parliament, in connection with a certain county council. He found during the past year that the Chairman had also got in contact with the same county council; and he did not think he had been any more victorious than he (Mr. Edwards) was. They all appreciated the very strong fight he had put up, and felt sorry for the result. He believed the Chairman, in the case he alluded to, had been limited to 3 feet; but he would like to hear something more on the point. He felt sure he would be voicing the feelings of the meeting in congratulating the Committee on the excellent work they had done during the past year.

ALKALI MANUFACTURERS.—DEPRECIATION SETTLEMENT.

Mr. W. A. SCHULTZ (Ascot), in supporting the adoption of the report, said he would like to refer first to the question of the alkali manufacturers' opposition to the Bills before Parliament. One of the Bills of which the Chairman had made mention being the Annfield Plain Gas Bill, in which he (the speaker) was personally concerned, and on which he gave evidence, he would like to emphasize Mr. Jones's remarks by saying that when the Alkali Manufacturers' Association presented their petition, they desired to make additions to the Annfield Plain Bill, to the effect that the Company should not be at liberty to deal in their residual products. This was vastly different from the position in which the matter stood to-day, when they were not permitted to purchase for the purpose of manufacture the residual products of other companies. It would have left them in this position, as Mr. Lloyd pointed out to the Committee, that, assuming they had ammoniacal liquor and manufactured it into sulphate of ammonia, they would not have been at liberty to sell this sulphate to anyone. It would have crippled companies entirely, if it had been permitted. He was glad the matter was not yet finally disposed of, and felt sure their legislators would not permit such a ridiculous hardship to be imposed on gas manufacturers, and a monopoly to be created for the alkali manufacturers such as oil companies at present possessed, enabling them to put up prices to any figure they liked. Perhaps as the Chairman had mentioned his name in connection with the question of depreciation, some of those present might like to hear a few words from him on the matter—especially as a good deal had appeared in print, and it had almost seemed as though he (Mr. Schultz) were in conflict with the Committee appointed by the gas companies. He had tried to make it clear that he was not in conflict with them. There might have been differences of opinion; but he did not wish to feel that it was a bone of contention between an influential Committee and himself. The position was simply that, single-handed, he broke down the famous circular of the Inland Revenue Authorities in 1909. He would not accept it, as it was absolutely contrary to law; and he went before the Commissioners, and in each individual case obtained a verdict against the authorities, who at last conceded the point that he had the law on his side. This being so, the question arose, How much should be allowed? The law distinctly said a company were to have such an allowance as should be represented by the diminished value of their plant from year to year. So they would see there was reason for the Chairman's remark that some of them would like to see the principle of depreciation carried right through the plant. While he (the speaker) was negotiating with the Inland Revenue Authorities, he communicated with Mr. Cash, and proposed that he should also have his cases adjourned, as he (Mr. Schultz) had agreed to have his. Then they all knew what followed—how the matter was taken up by the Institution of Gas Engineers. It might appear from the remarks in the Press that he had withdrawn himself from any participation in the deliberations of the Committee with the idea of opposing them; and he had been obliged to submit to this impression, because he did not wish in any way to hamper the movements of those who had been responsible for the conduct of the proceedings which had culminated in the agreement with the Inland Revenue Authorities. He attended a Committee meeting, and, as he told the members at Horseferry Road, he could not agree to the principle of allowing depreciation on one part of the plant and excepting renewals on another part. The logical and legal position was that it ought to be depreciation on the whole. At the meeting when the Committee drew up their scheme, as he could not agree to this portion of it, it was suggested that he should go before the Commissioners with the Committee and explain his views. He thought, however, it would not be in the interest of the scheme that he should appear before the Commissioners as in any way opposing it. Therefore he said, "No, he would not hamper the scheme;" and, the Committee meeting being over, he left the room, and knew no more about it until the matter appeared in print. He then thought it his duty to explain his views before the gas industry, and also expressed his willingness to meet the Committee for the purpose of arriving at a general agreement in regard to the question. Well, it appeared from the letter which was published from Mr. Cash that the time had gone by for any meeting of this sort.

The CHAIRMAN said he did not want to interrupt, but nobody knew better than did this Committee the valuable assistance rendered by Mr. Schultz by his persistent fight on the depreciation question. They must keep their discussion close to the point.

Mr. SCHULTZ (continuing) remarked that he had no more to say about this. With regard to depreciation, they would remember that none was to be allowed by the 1909 circular; but this had been broken down. A point which had been conceded by this scheme was that if the renewals were at any time in excess of the amount of the profits, the balance of the expenditure could be carried forward to future years. This was a very important concession. Then there was a paragraph in the scheme which related to services from the main to the gas consumer's premises; and according to the circular the expenditure was to be allowed. He did not know whether they understood that this meant that all capital expenditure on services was to be allowed. ["Yes."] He himself understood it so; but he might say that he was with a surveyor on the previous day, and that gentleman was surprised to think this view was taken. It was his wish to ascertain from those present whether his own view was generally regarded as the right one. The whole thing had now been carried through to a successful issue, and all praise should be given to the Committee who had done it. Certainly, a great concession had been obtained, and the Association were to be congratulated on having taken their part. If they had not got all that he would have liked, he was not going to say that the scheme was not a very satisfactory one; and, for his part, he would be quite prepared to agree to it.

Mr. T. H. HAZELL (Newport, Mon.) said he would like to answer the question put by Mr. Schultz in regard to services. Wherever charged, they could be brought into the statement for the allowance for income-tax purposes. There was no question about this in the mind of any member of the Committee, on which he had had the honour of serving. He was glad to find that Mr. Schultz, though at one time he appeared in opposition to the Committee, now agreed that matters were on a proper basis. He did not believe any members of the Committee thought they were quarrelling over a "bone of contention" with Mr. Schultz.

The CHAIRMAN: We do not want to discuss much outside our own business.

Mr. HAZELL: The feeling was that Mr. Schultz found his fiddle out of tune, and therefore left the orchestra.

The CHAIRMAN: I appeal to you not to say things like that. Mr. Schultz's view is quite logical; and we have got a very good result.

Mr. HAZELL said he thought it was the general opinion that Mr. Schultz was a pioneer in this movement; and now they had arrived at a very satisfactory basis, which it was hoped every gas company would adopt. ["Hear, hear."] As to the Committee's report, the Chairman had referred to the fact that the Association formed a sort of watch-dog to gas companies. It was something like the usual watch-dog—when one came to the gate, one did not know quite which end of the dog to believe, the barking end or the wagging end. The Chairman

had had some experience of both; and he (the speaker) for one, was very glad to know he found exactly when to put either end in operation. As to the alkali manufacturers, every one was pleased to see that the Committee were taking up this matter vigorously, because even in the case of those companies not at present affected by the clause, the time would come when every little thing that formed a part of the processes of the works would have to be used in the most economical manner, and means found to make the best of it in the interests of the consumers. He knew a case of a small gas company that was bought up by a larger company; and it was found in the case of this small company that they had so much difficulty to get rid of their ammoniacal liquor that the only solution was to buy a little field and let it run to waste. This was against every interest of the present day; and it was a most desirable thing that every power that could be given to this Committee should be given to them, in order to prosecute the demand of gas companies for justice.

The Chairman's Reply.

The Chairman said they had had a very thorough and valuable discussion. He had been appealed to by one of the speakers about the steam-roller. The case in which 3 feet was put in the Bill was prejudiced, inasmuch as there were three separate interests involved, and one had already made an agreement with the surveyor for 2 ft. 6 in. Personally, he had always been against any figure. The Chairman of the Committee, however, thought that if there was to be any protection at all, it should not be limited to 2 ft. 6 in. He believed he was sorry for it afterwards. Subsequently he allowed him (Mr. Jones) to suggest a clause which he and his Committee adopted. He (the Chairman of the Committee) said, however, that he hoped it was not always going to be put in force against the Company, as it was only intended as a safeguard, and not to bind the Company. He (the speaker) explained that the law already gave the surveyor power to go to 10 feet if necessary. But when one got before a Committee, and saw a gentleman who perhaps had no scientific qualifications, but happened to be surveyor to a small authority, and so knew more than did those who had laid thousands of miles of mains, it was difficult, because he would have his say, and the Committee thought as he was not in the Company's service he might be more independent than the Company's witnesses. The point was put to him (Mr. Jones) that if he would consent to the 20-ton roller, they would let the thing go through; but he answered that he was not going to give away his legal position. He was grateful to Mr. Schultz for the explanation he had made, and was glad he agreed with the settlement. In this world, one must be thankful to get what one could.

The motion for the adoption of the report was then carried unanimously.

The Committee.

The Chairman then moved the re-election of the retiring members of the Committee, as named in the report.

Mr. A. W. Oke (Southampton), in seconding, said the speech of the Chairman that day, and the elaborate report that had been placed before them, had shown that very important work was going on in connection with the Association. From time to time, Boards of Directors had hesitated as to whether they should subscribe, or continue or increase their subscriptions. He felt sure, however, that when they read the proceedings at this meeting there would be no further doubt in their minds.

The retiring members having been unanimously re-elected,

Mr. Edward Allen (Liverpool) was called upon to acknowledge their re-appointment. He said that, while there had been more work than usual during the past year, it had been of a very interesting character; and though they might not have made so much of the Unemployment Insurance Committee as of other business dealt with, it really had been a very important matter. The reasonable way in which the Umpire met the Committee, and accepted the information given by the members, was highly gratifying; and directors of various companies were surprised to find they were able to get exemption for such a large number of men employed on gas-works.

A Vote of Thanks.

Mr. R. O. Paterson (Cheltenham) said it was their duty to express their thanks to the Chairman of the Committee for his conduct of the business that day, and for the great amount of time he had devoted to the interests of the Association during the past year. They could gather from Mr. Jones's speech that the work had been a considerable tax upon his time as a consulting engineer in Westminster; and they must feel that they owed him a deep debt of gratitude. He therefore proposed a hearty vote of thanks to the Chairman.

Col. H. Oakden Fisher (Cardiff) seconded the proposal, which was cordially agreed to.

The Chairman said that, of course, they included in the vote the Committee. He could only do what he did in connection with the Committee. Therefore, on their behalf as well as on his own, he thanked those present for the compliment.

Public Lighting of Baslow.—Up to the present time, the Derbyshire village of Baslow has this season been without public lights, owing to half the donors of the lamps having refused to continue to pay for the gas. The District Council have considered the matter, and decided to take a post-card ballot on the question whether the cost of the public lighting should be paid out of the rates. The result was announced at the last monthly meeting of the Council, when the Clerk stated that out of 186 electors 148 had returned their post-cards; and there were 111 votes against the proposal, 36 in favour of it, and one was neutral. The approximate rateable value of the property in respect of which the voting was against the change was £1184, and £805 for it. Considerable discussion thereupon ensued; the Chairman (Mr. R. H. Mabbott, J.P.) expressing the opinion that they could not expect visitors to come to stay in the village during the winter when, if they ventured out at night, they ran the risk of meeting with a serious accident. Eventually, it was decided to light those lamps which the donors would pay for, and to appoint a Sub-Committee to draw up a scheme of voluntary subscriptions in regard to the remainder.

TRADING PROFITS IN AID OF RATES.

Manchester Corporation Special Committee's Report as to Basis of Contribution.

The question of the amount of profit trading departments of the Corporation should hand over yearly in relief of rates was before the Manchester City Council last Wednesday, and gave rise to a rather long discussion. In May of last year, the Council appointed a Special Committee to inquire into the matter. It was known as the Trading Profits Committee; and it only quite recently completed its labours. The findings of the Committee are embodied in a report which came up for consideration. In effect, the Committee recommended that any arrangement arrived at should continue for three years; that the Gas, Electricity, Tramways, and Markets Committees should make contributions in aid of the city rate, that such contributions should be based upon capital expenditure, and that the contributions to be made by the several Committees named should be the following percentages on the total capital expended: Gas Committee, 1¾ per cent.; Electricity Committee, 1 per cent.; Tramways Committee, 5 per cent.; Markets Committee, 2 per cent. The capital debts of the trading undertakings at the end of the financial year and the amount which the percentages recommended would represent in relief of the rates, are set out in the report as follows:—

	Capital.	Proposed Contribution.	Actual Contribution.
Gas	£2,950,712	£57,637	£50,000
Electricity	2,792,402	27,924	24,500
Tramways	1,998,594	99,930	100,000
Markets	848,807	16,976	14,000

The report also showed that during the last ten years the contributions in aid of rates by the respective trading departments have increased from 7·08d. to 10·65d. in the pound. During the same period, the capital expenditure of the trading departments has increased as follows: Gas Committee, £644,023; Electricity Committee, £1,628,076; Tramways, £1,367,582; and Markets, £44,752—making together a total of £3,684,453. The renewals and reserve funds, &c., are: Gas, £157,811; Electricity, £182,734; and Tramways, £447,506.

Alderman Copeland, who moved the adoption of the report, said the basis on which the Committee had arrived at their conclusions was on the capital expenditure of the various Committees; and it was not a great hardship they were asking at the present time. In all probability, he added, the Imperial Parliament would come to the help of the local authorities, and put the whole matter of local taxation on a better footing than it was at the present time. Certainly, there was a general opinion that the authorities should receive larger grants than they did now.

Mr. Melland, in moving an amendment that the report be sent back, said the whole principle of making contributions in support of the rates by the trading departments was vicious. He admitted that it was not possible to do away with the system at once in its entirety; but they could begin by doing it in a small way. There was a strong feeling outside that the system was altogether wrong, and an indirect tax upon the very people who could least afford to pay it.

Alderman Walker was also against the adoption of the report. It was clear, he pointed out, that a trading committee was enabled to borrow money cheaply, because it had behind it the security of the ratepayers, and should therefore pay, in fairness, something towards the rates; but 1 per cent. was as much as had any chance of being adopted in any Bill. In his opinion, the proper charges upon an undertaking were: (1) Production and distribution; (2) debt reduction, charges, and interest; and (3) a small amount to the ratepayers on the actual amount of capital at stake. Beyond this he opposed the payment of a single farthing for profits. He declared that what was gained in reduction of rates was lost elsewhere. For instance, cheap gas and electricity would bring new industries to the city.

Mr. W. Kay, Chairman of the Gas Committee, said he desired to have this matter of contributions in aid of rates dealt with fairly. To begin with, he protested against the recommendation of the Special Committee that the Gas Department should be taxed more heavily than its competitor. And it was useless for members of the Council to go on to public platforms and clamour for cheaper gas and lower tram fares, and then come to the Council and vote for large payments by the trading departments in relief of the rates. At the same time, he did not see why the percentage of contributions from the Gas and Electricity Departments should be different—one body being asked for 1 per cent. and the other 1¾ per cent. With regard to the competition between the two departments, he held in his hand documents which showed that at the present time the Gas Department was suffering a loss of £600 a year owing to the Electricity Committee quoting a price to which the Gas Committee would not give a moment's consideration. The Gas Committee had pursued a policy of having an all-round fixed price of 2s. 3d. per 1000 cubic feet for gas. They had no special agreements; and he hoped the Council would support him by saying that if the Committee paid this extra 1 per cent. profit they must have a certain amount of liberty for conducting their business, and be placed on the same level as the Electricity Department. If the Electricity Committee were allowed to quote special prices for special jobs, which, from the question of load factor, might be satisfactory, the Gas Committee should have the same privilege. He asked members of the Council to take the question of street lighting and the reports of the experts which had just been published. They would see therefrom that gas came out badly. In effect, the lighting of Portland Street and Princess Street was said to be, for all practical purposes, equal; but in regard to price gas was beaten, for the reason that the Gas Department charged a figure for gas which gave a profit, but the Electricity Committee did not. To ask the Gas Department for £52,000 and the Electricity Department for only £29,000 was not fair. All he asked was that the measure the Council meted out to one Committee should be meted out to the other.

In the subsequent discussion, Alderman Goldschmidt reminded the Council that if the contributions were not received from the trading Committees the money would have to be found elsewhere; and he

asked if members were prepared to recommend an advance of 1s. in the pound in the rates instead of having contributions from the several Committees.

After other members had spoken,

The Lord Mayor suggested that, having regard to the importance of the subject, it would be better to adjourn the debate to the December meeting; and this was agreed to.

Allegations of Selling Electricity Under Cost Denied.

The question of the differential charges made for current by the Manchester Electricity Department was raised at a Local Government Board inquiry held at the Manchester Town Hall last Friday in regard to an application made by the Corporation for sanction to borrow £87,160 for the purposes of the undertaking. Mr. G. Howarth, the Chairman of the Electricity Committee, having given evidence, was cross-examined by Mr. Boot, Solicitor to the Manchester Ratepayers' Association. He put it to witness that large power consumers were being given a very great preference in the matter of charges, and that it was because of this exceptionally cheap rate that additional borrowing powers were being continually needed, to the disadvantage of the ratepayers. Mr. Howarth, in reply, said the increased demand for current in recent years had been for power. He was quite aware that the Electricity Committee had been charged with selling below cost; but he thought the results of last year's working of the department disproved this. During the year ended in March last, they appropriated to the renewals account £21,000, to the sinking fund £102,000, to interest £67,000, and to the city fund £24,000. Had it been, as so many said, that they were supplying power at less than cost, clearly these payments could not have been made. Asked if his Committee competed with the Gas Committee in the way of special charges for special jobs, Mr. Howarth said that, apart from street lighting, there was no competition between the two departments. The increased demand was for current for power, which the Gas Department could not supply. Mr. S. L. Pearce, the Chief Electrical Engineer to the Corporation, replying to Mr. Boot, declared that all the sales of the department showed a margin of profit, but it fluctuated. They could not make the same profit out of every consumer, because their demands varied so much. When pressed on the point by Mr. Boot, witness said: "You must accept my statement that there is a margin of profit on all our sales; and I cannot go beyond that." At this stage, Mr. Heath, the Deputy Town Clerk, observed that what was done in Manchester in this respect was common to all municipalities and electrical undertakings. One had to remember that in Manchester the Gas Department had been in operation for about a hundred years, and that a great amount of work had been done out of revenue. There was no further opposition, and the inquiry closed.

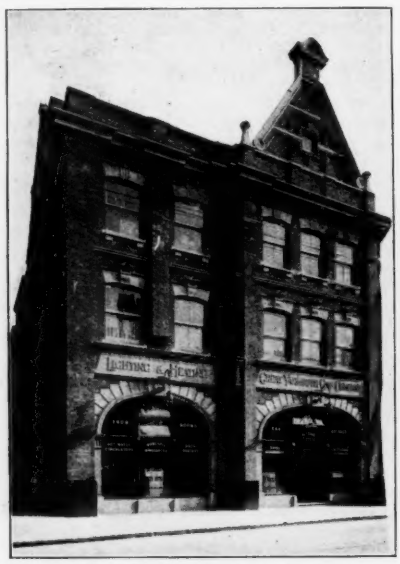
NEW SHOW-ROOMS FOR THE YARMOUTH GAS COMPANY.

Opening Ceremony.

In order to afford the gas consumers and inhabitants of Great Yarmouth ample opportunity of inspecting the latest appliances for the utilization of gas, the Gas Company have erected a handsome block of show-rooms in close proximity to their offices; and they were formally inaugurated on the 25th ult. in the presence of the Mayor (Alderman F. Arnold), who was accompanied by the Mayoress. The new building has a frontage of 47 feet and a depth of 57 feet; and it is considered to be one of the finest gas offices in the Eastern Counties. A commodious warehouse has been provided in the basement; and on the ground floor there is a fine show-room for the display of all domestic gas appliances—from cookers, fires, carving-tables, plate-warmers, baths, radiators, and hot-water circulators, to gas-engines. This floor is handsomely furnished, and lighted according to the latest ideas. A central staircase gives access to the second floor, which is expressly arranged for lectures and demonstrations; and it is admirably fitted for the purpose. On the floor above, more space is devoted to storage. A lift, driven by a gas-engine, runs from the basement to the roof, for the service of each floor. The new buildings throughout are excellently appointed.

There was a good assembly in the lecture-room for the formal opening of the new building. Sir Inglis Palgrave, the Chairman of the Company, presided; and several Directors and the General Manager, Mr. W. J. Carpenter, Assoc.M.Inst.C.E., were present.

The Chairman, in welcoming the preprietors and others, said they had met, at the desire of the Directors, among whom they had the pleasure of including the Mayor, in order that they might see and understand what the Company were doing for the development of their



Front Elevation in King Street.

The Hall and Staircase.

business. It was not proposed to go into the matter of the distribution of light, but particularly to direct attention to the use of gas for supplying warmth and for cooking. In the latter they would be assisted by Mrs. Collins, who was not only a first-rate cook, but an excellent teacher. Some people had a very mistaken idea that cooking by gas was expensive; but the lecturer would be able to show that besides being good it was cheap. She would explain that an excessive use of gas caused the failure, in almost every instance, of the gas-oven. A feature had been introduced in a cookery "question-box." Any lady wishing for a demonstration of a particular dish need only to write down the request, deposit it in the box, and Mrs. Collins would endeavour to arrange a time for the cooking and the necessary explanation. The Directors felt assured that there was every reason to expect great assistance from the new premises to all concerned in their business. They hoped the shareholders and the Yarmouth public would agree that all had been done to equip the show-room with the most modern articles obtainable. With regard to the lecture-room, it was the intention of the Directors to formulate a scheme embracing a weekly cookery class or lecture on one afternoon and evening, as might be arranged, during the winter season, and to secure occasional lecturers for the education of the Company's apprentices and workmen engaged in the important work of the distribution of gas by means of the scientifically constructed burners now on sale. The Directors were pleased with the response of the consumers; and it was hoped by the cookery lectures to still further educate the users of gas-stoves in the elementary principles of good cooking, with the accompanying necessity of absolute cleanliness if satisfactory results were to be obtained. It was with pleasure that he attended to declare the rooms open for the furtherance of the interests of the public and the shareholders.

The Mayor said that, as a Director, he was glad the Company had put up a building of such notable dimensions for the advancement of gas; and he expressed the hope that this development of the undertaking would prove beneficial to the shareholders and others. They all felt very pleased with the new building and the way in which everything had been carried out under the direction of their Engineer and Manager. The Company were highly favoured in having so energetic and capable a man as Mr. Carpenter to direct their affairs.

A vote of thanks having been accorded to Sir Inglis Palgrave, Mr. T. A. Rising (a Director of the Company) introduced Mrs. A. M. Collins, who gave a cookery demonstration with gas-stoves.

INCREASED OUTPUT OF GAS IN BIRMINGHAM.

The Effect of Reduced Prices.

Writing in the November issue of the Birmingham Gas Department Magazine, on the effect of reduced prices on sales of gas, "W. M." gives the following interesting facts.

During the half year to Michaelmas, 1912, the gas consumption within the Birmingham area was 269 million cubic feet, or 8½ per cent. more than that of the corresponding half of last year. As usual, the

automatic meters showed the greatest increase, though all the figures are good, as the following table shows :—

Class of Meters.	1911.	1912.	Increase.
	Millions.	Millions.	Millions.
Automatic	558	702	144
Lighting and domestic	1647	1696	49
Manufacture	212	272	60
Motive power	580	611	31
Public lighting and contracts . .	139	124	Decrease 15
Total	3136	3405	269

Probably the most gratifying figure is the increase of 60 millions registered through the "manufacture" meters. This increase is mainly new business; and it indicates not only the wide field there is in Birmingham for gas for industrial purposes, and the energy of the staff in obtaining it, but also the satisfaction of those Birmingham traders who are already using gas for these purposes.

The continued increase through "motive power" meters may be taken to mean that Birmingham traders as a body confirm what one of them (who threw out his suction plant a year ago) told the writer—viz.: "You can't beat gas at 1s. 4d. per 1000, less 5 per cent. discount"—that is, 1s. 3·2d. net. As regards the lighting and domestic meters, we feel convinced that the extended use of cooking-stoves and gas-fires will ensure a steady increase under this head. As we all know, the decrease of 15 millions in public lighting gas is due to the curtailment of the street supply in April last.

All must agree that an undertaking which supplies a large manufacturing town with cheap gas is doing good work, and that the value of its work is not adequately shown by simply taking into consideration the "balance of profits" paid over each year.

NEATH GAS-WORKS EXTENSIONS.

An application by the Neath Town Council for borrowing powers in respect of the gas-works, for the acquisition of land for extensions, and for a Provisional Order to partially repeal, alter, or amend the Neath Corporation Gas Act, 1874, was the subject of a recent inquiry by Mr. R. C. Maxwell, on behalf of the Local Government Board. There was no opposition to the proposals, which were explained by the Town Clerk (Mr. E. C. Curtis). He said the undertaking was a progressive one; and the land referred to (which was situate to the south of the present gas-works) was really needed. The question of providing some working capital was discussed; and the Inspector pointed out that it might be possible to do this out of the profits on the works, instead of diverting any such sum in reduction of the rates, as had hitherto been the custom. Evidence was given by the Engineer and Manager (Mr. R. A. Browning), and the Inspector, before proceeding to view the site, thanked both gentlemen for the information they had afforded him.

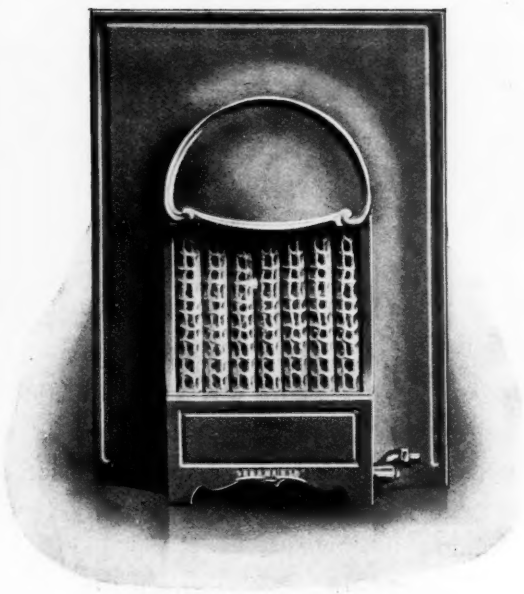
Referring to the matter, the "Mid Glamorgan Herald" said: "The inquiry by an Inspector of the Local Government Board as to an application of the Neath Corporation to borrow money for the purchase of land for gas-works extensions and other purposes, shows that the counter-scheme of electricity is not seriously affecting the onward progress of the gas undertaking. The electricity undertaking was installed in the borough in 1905; and a five years' statement of the gas manufacture was submitted to the Inspector. This showed that at the beginning of the year 1907 the make of gas was 104 million feet, and gradually advanced year by year until in March of the present year the output had reached 132 million feet. It must be borne in mind that during the whole of the period of six years under notice, electricity had been installed both in the borough and in the adjacent rural area, which latter fact withdrew the public lighting by gas therefrom. If anything was needed to show the progressive value of the gas undertaking, one fact is sufficient—namely, that in the year 1878, when the Corporation acquired the gas undertaking, the make of gas was 20 million cubic feet. Contrast this item with the figures given above, and one begins to realize how matters have advanced. In 1907, the number of consumers was 3560. In the current year they amount to 4872—an increase of 1312 consumers as compared with the first-named figure."

SALFORD ELECTRICITY UNDERTAKING.

Further Allegations of Current being Sold Under Cost.

The policy of the Electricity Committee of the Salford Corporation in making concessions to large users of current, came in for considerable criticism at Wednesday's meeting of the Council.

The discussion was started by Mr. Peter Hampson, who took objection to a proposal on the part of the Electricity Department to supply a local firm with electrical energy on special terms. In moving that the minute be referred back, he declared that this system of the Electricity Committee was a ruinous one from the ratepayers' point of view. In the case under notice, he was of opinion that current could not be supplied on the terms proposed at a profit to the Corporation. Why, he asked, should the 2000 odd ordinary consumers subsidize the rich firms? Speaking generally as to the Electricity Department, he said it was not satisfactory that, after £500,000 had been spent in capital on the undertaking, there should only have been £24,000 available in relief of rates. Mr. Bescoby spoke strongly against differential treatment between larger and smaller consumers. When it was remembered that they had differential charges of from ¾d. to 3½d. between large and small consumers, he thought it must be agreed that



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SHOW-ROOMS AND BRANCHES: 25, Princes Street, Oxford Circus, W.; 136, Renfield Street, GLASGOW; 56, Broad Street, BIRMINGHAM; 83, Old Market Street, BRISTOL; 13, Whitworth Street West, MANCHESTER; 8, Exchange Place, Donegall Street, BELFAST; 333, Queen Street, MELBOURNE; and 12, Cunningham Lane, Pitt Street, SYDNEY, N.S.W.

it was deplorable, unfair, and unjust. While supporting the Committee in their action, Alderman Snape described the electricity undertaking as "a huge white elephant." Mr. Bratherton declared that the Committee were engaged in selling electric power at below cost price, and yet, while they were selling at "these ridiculous prices," they proposed to spend £250,000 in creating further current, to continue, he supposed, doing the same thing. The remedy was to avoid selling electricity below cost price. The Chairman of the Electricity Committee (Mr. Billington) said the department was not in as bad a way as some members of the Council would make out; and he presented figures to show that the Electricity Committee were paying off their loans twice as quickly as the Tramways Committee, and two-and-a-half times as quickly as the Gas Committee. They wanted more modern plant, it was true; but this was a legacy. He defended the policy of concessions being made to large users so as to get their business.

Mr. Hampson's amendment to refer the proposed contract scheme back for further consideration was lost by 15 votes to 7.

Stockport Gas-Works Extensions.—Application having been made by the Stockport Corporation for authority to borrow £38,550 for the purposes of the gas undertaking, a Local Government Board inquiry was held last Wednesday, by Mr. F. O. Stamford, at the Stockport Town Hall. Mr. S. Meunier, the Gas Engineer and Manager, furnished particulars as to how the money asked for was to be applied. He said that £12,000 was for mains and services for three years, and a like sum for the purchase of meters. The whole of the manufacture of gas was now concentrated in works which had a capacity of 4½ million cubic feet of coal gas and 1½ millions of carburetted water gas. The major part of the main condensing plant had a capacity of 2 million cubic feet, and it was proposed to increase this to 3 millions. It was also intended to put in new tar-extractors and an ash-pan washing plant. There was no opposition to the application.

Water Supply at St. Neot.—The provision of a water supply for St. Neot (Liskeard) was the subject of a Local Government Board inquiry last Tuesday; a petition, signed by a number of parishioners, suggesting a new scheme from Tregenna to separate cottages, having been forwarded to the Board. On the ground that it was too ambitious, the scheme had been rejected by the Liskeard Rural District Council. Mr. A. de Castro Glubb represented the Rural Council; Mr. Percy T. Pearce (Plymouth), the Parish Council; and Mr. A. W. Venning (Liskeard), the petitioners. It was stated that the assessable value of land and property in the parish was £2848. Mr. Montague Luke, called for the petitioners, stated that the new source would yield 28,000 gallons of water per day, which was a plentiful supply; and they estimated that the expenditure would be £730. Mr. Glubb said the scheme was far too ambitious for so small a village; while Mr. Pearce contended that it was impracticable owing to the opposition of a riparian owner of the fields through which flowed the suggested supply for each house in the village.

NOTES FROM SCOTLAND.

From Our Own Correspondents.

Saturday.

Edinburgh.—At a meeting of the Edinburgh and Leith Corporations Gas Commissioners—presided over by Mr. Inches—on Monday, Bailie Reid called attention to a decision of the Commissioners not to extend their gas-pipes meantime to Barnton. The Works Committee were of opinion that the extension might be made provided a satisfactory report was obtained as to intending consumers, who would pay for seven years 5 per cent. on the capital expenditure required. The gentleman who had raised the matter wrote stating that he was unable to give the information required; and in the circumstances the Commissioners resolved to do nothing further. Bailie Reid moved that the matter be re-committed for further consideration, and that there should be an inquiry by the officials of the Commission as to the different occupiers of houses in the district who would be likely to use gas for lighting, heating, or cooking. He thought the decision come to by the Commissioners was not quite in accordance with their forward policy. The Chairman stated that the report submitted to them showed that the capital expenditure would be about £1200; while the demand for gas was very small. There was no seconder to the motion, which accordingly dropped. The Superintendent of the Royal Infirmary applied for a supply of gas to the large kitchen of the institution, at the rate of 2s. 3d. per 1000 cubic feet—being the charge at which gas was supplied to restaurants, &c. The consumption was upwards of 700,000 cubic feet per annum. Reporting on this application, Mr. Masterton stated that if the same terms were granted to similar institutions to the Infirmary there would be a decrease of revenue to the extent of £210 per annum. He hardly thought, in view of the estimates being made up and passed by the Commissioners, that it would be judicious to open up the question before the end of the year. The matter was remitted to the Works Committee for consideration.

Glasgow.—A scheme for consolidating the work of three Glasgow Corporation departments, at present carried on under the separate heads—gas, water, and electricity—has been approved by the Special Committee on the collection of rates, charges, and assessments. The present staffs number 317 altogether; and the cost is £27,118. The reorganized staff would number 270; and the cost is estimated at £23,048, which would mean a reduction of £4070. The scheme was submitted to the Town Council on Thursday, with the recommendation that it be remitted back to the Committee in order that the proposals might be carried into effect. After a prolonged discussion by the Council, the scheme was defeated by 32 votes to 28.

Aberdeen.—A case of suicide by gas occurred in Aberdeen on Wednesday. Mrs. Cumming, residing in Jamaica Street, was found by her husband seated on a chair near the fireside with a coat over her head and a gas-tube in her mouth.

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Blantyre.—Some time ago, as the result of complaints made by several of the ratepayers and large consumers of gas at Blantyre that the price of gas was exorbitant, the County Council of Lanark referred the matter to their Parliamentary Bills Committee, and eventually Mr. W. S. Brown, the Gas Manager at Giffnock, was appointed to make an inspection of the Blantyre Gas Company's works. He did so; and his report was presented in March last. Mr. Brown complained that the situation of the works was unfavourable, that the carbonizing plant was not up to date, that the mains were defective, with consequent great loss of gas, and that the price charged (3s. 4d.) would not be sanctioned if the Company were a statutory one. The report was sent to the Directors, who replied to it early in April. They characterized Mr. Brown's reference to the carbonizing plant as almost an insult, and charged him with never having inspected it. They said he was in the works only half-an-hour, and during the greater part of the time was in the office engaged in ordinary conversation. The Directors dealt at some length with the points raised by him, and also with the statements made by the ratepayers' representatives. In a second report, Mr. Brown replied to the Directors' observations, and said he based his details on information given to him by the Manager. A Sub-Committee of the Parliamentary Bills Committee, to whom the matter had been remitted, thought no good purpose would be served by sending the Company a copy of this report. After considering the whole question, they instructed the Clerk to inform the Directors that, though they were of opinion that, as regarded both the price of gas and the conditions of supply generally, an improvement could be effected, they did not desire to prejudice the Company in any way, in view of what they had lately done and what had been promised for the future. They would therefore defer the matter for six months. As this decision was come to in June, the subject will come up again next month. It may be mentioned that since Mr. Brown's inspection of the works the Company have reduced the price of gas to 2s. 11d. per 1000 cubic feet. In the early stage of the trouble, there was talk of obtaining a supply of gas from the Hamilton Corporation, who had expressed their willingness to furnish it, with the consent of the County Council.

Buckie.—Operations are proceeding at the water-works at Rochombie for the repair of the filters, under the direction of Mr. John Chisholm, of Airdrie. Messrs. A. Milne and Son have the contract for the work, in the carrying out of which it has been found that water is forcing its way into the filters through the concrete bottom. The filters are built over the old watercourse, and the making of them water-tight is now the object in view. A serious problem is the sinking of the breast-work of the reservoir which dams back about 15 million gallons of water. The whole of the embankment, it is stated, has sunk about a foot. Through the centre of the embankment is a wall of puddle clay, which goes down 20 feet below the level of the bottom of the reservoir. Recently the foundations of the gangway which runs to the conning tower in the reservoir collapsed; and it has since been found that the embankment between the clay wall and the reservoir is practically a bog.

Doune.—A petition by those who do not use gas is now being taken round the ratepayers against the Town Council purchasing the gas-works. As the municipal election at this time will not change the opinion of the majority of the town councillors, the agreement by the Council to purchase by arbitration will stand. The Gas Company some time ago offered to sell their works and all belonging to them for making gas to the Town Council, who agreed to take steps to purchase. According to the Act regulating the sale of such an undertaking, a valuation was made by both parties, and the purchase price agreed to. A judge of no mean authority says the buildings at the works and the house for the Gas Manager, with the piping and iron connected with the undertaking, would, though the iron were sold for scrap, realize more than is asked by the Gas Company. It is said that an offer of more money has been made by a private gentleman; but the shareholders want to see the concern in the hands of the ratepayers, or to keep it in their own if the Council do not purchase.

Falkirk.—At a special meeting of the Town Council on Friday, accounts were passed for payment in connection with the abortive Order for the burgh extensions. It was stated that the total cost of the present year's Order, including expenses of promotion, Counsel's and witnesses' fees, &c., was £5204. The expenses of the Order promoted and rejected last year were £4171; so that the whole expenditure on the two extension Orders was £9375. The Council anticipate being able to pay off the expenses in five years without raising the rates.

Inverurie.—At a special meeting of the Town Council on Friday, Provost Skinner presiding, it was reported that the Town Council had considered, in Committee, the question of taking over the burgh gas concern. Mr. Pickersgill moved that they make an offer of £4500. Considering the price of coal and other materials, the consumption of gas, and allowing reasonable interest and depreciation, it would not pay them to give more than £4500 for the concern. The motion was unanimously adopted.

CURRENT SALES OF GAS PRODUCTS.

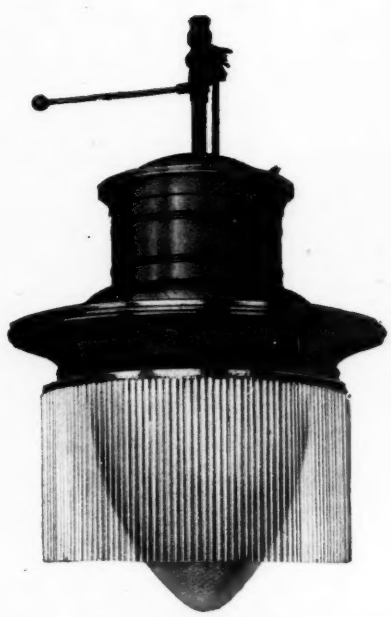
LIVERPOOL, *Nov.* 2.

Sulphate of Ammonia.

During the past week there has been little change in either the tone or the value of this article, but on the whole prices have been inclined to recede still further. The demand has been of rather a desultory character—middlemen having apparently covered their present requirements, and direct buyers deeming it still good policy to wait for lower prices; while it is reported that in certain quarters sulphate is having to be stored. The closing quotations are £13 17s. 6d. per ton f.o.b. Hull, £13 18s. 9d. per ton f.o.b. Liverpool, and £14 per ton f.o.b. Leith. There is no new feature to comment upon in the forward position, dealers continuing to make sales over the first half of next year at a much smaller premium than manufacturers will entertain.

Nitrate of Soda.

The market for this material has again advanced, and holders



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LONDON, *Nov.* 4.

Tar Products.

The markets for tar products have remained steady throughout the past week, though there has been a further slight decline in the price of pitch. Benzols are fairly steady, though further sales are reported at slightly lower prices. Solvent and heavy naphthas are firm. Creosote well maintains its price; and there is a good inquiry for both prompt and forward delivery. Crude carbolic is unchanged.

The average values during the week were: Tar, 27s. 6d. to 31s. 6d. Pitch, London, 44s. 6d. to 45s. 6d.; east coast, 44s. 6d. to 45s.; west coast, Clyde, 45s. 6d. to 46s. 6d.; Manchester, 44s. to 44s. 6d.; Liverpool, 44s. to 45s. Benzol, 90 per cent., naked, London, 11½d.; North, 10¾d.; 50-90 per cent., naked, London, 11d.; North, 10½d. to 11d. Toluol, naked, London, 11½d. to 1s.; North, 11d. to 11½d. Crude naphtha, in bulk, London, 5½d. to 5⅝d.; North, 5d. to 5¼d. Solvent naphtha, naked, London, 1s. 1½d. to 1s. 2d.; North, 1s. 1¼d. f.o.b. Heavy naphtha, naked, London, 11½d. to 1s. f.o.b.; North, 10½d. to 11d. f.o.b. Creosote, in bulk, London, 3⅛d. to 3¼d.; North, 3d. to 3⅛d. Heavy oils, in bulk, 3⅜d. to 3½d. Carbolic acid, casks included, 60 per cent., east coast, 1s. 11d. to 2s.; west coast, 1s. 10½d. to 1s. 11d. Naphthalene, £5 to £9; salts, 45s. to 55s., bags included. Anthracene, "A" quality, 1½d. to 1⅝d. per unit, packages included and delivered.

Sulphate of Ammonia.

There is no improvement in the market for this article—in fact, prices are written a little lower than last week's quotations. There has been no increased demand; and tender parcels appear to have been able to meet the request. Outside London makes are quoted at £13 7s. 6d.; Hull, £13 18s. 9d. to £14; Liverpool, £14 to £14 1s. 3d.; Leith, £14 2s. 6d.; Middlesbrough, £14.

COAL TRADE REPORTS.

Northern Coal Trade.

There is a strong demand in the northern coal trade, and prices are firmer generally. In steam coals, best Northumbrians are steady at about 13s. 10½d. to 14s. 2d. per ton f.o.b. For second-class steams, 12s. to 13s. per ton is quoted; and for steam smalls from 10s. to 10s. 9d. The demand for steam coals is firm for this time of the year, when the Baltic demand usually falls off. In gas coals, the inquiry is full, both for home and foreign use; and the large request that is known for Durham coal for other uses stiffens prices generally, and affects the price of gas coal. Best Durhams are now 15s. per ton f.o.b.; second-class gas coals are about 14s. to 14s. 3d.; and "Wear" specials are from 15s. 3d. Supplies of good gas coal are not easy to get for prompt delivery. One large company has paid about 13s. 9d. for an additional supply, and another about 14s. per ton. The tenders for the supply of coals for Stockholm have been sent in; but the figures have not yet transpired. Comparatively high prices are, however, believed to have been quoted, as both the coal and the sea freights are higher; and these factors influence coal from all parts. Coke is firm. Gas coke is now a little higher at 23s. to 23s. 6d. per ton f.o.b. in the Tyne.

Scotch Coal Trade.

Throughout all departments there is a steady trade; and the only matter that is causing concern is the scarcity of waggons. On the Glasgow Coal Exchange last Friday, the following were the prices quoted f.o.b. Glasgow: Steam coal, 11s. 6d. to 12s.; splints, 13s. 6d. to 14s.; ell, 12s. 6d. to 12s. 9d.; trebles, 13s. to 13s. 6d.; doubles, 12s. 6d. to 13s.; and singles, 12s. to 12s. 6d.

Oldham Gas-Workers' Wages Advanced.

As the result of prolonged negotiations between the Oldham Corporation Gas Committee and representatives of the Gas-Workers' and General Labourers' Union, an amicable settlement has been arrived at in regard to the men's demands for more wages and altered conditions of working. The matter has been under consideration off and on since May last, and quite recently the men threatened to strike work if some concessions were not made by the department. At first, the men asked for an advance of 5d. per shift to all shiftmen; ½d. per hour increase for all yard men and other labourers employed on gas-works premises; for all classes of workmen, one week's holiday a year with pay, and payment of double time in all cases where such is not now paid for work on Christmas Day and Good Friday, and single pay when not working; and 2s. advance per week to meter inspectors, and payment for recognized Oldham holidays. The settlement is on the basis that machine men in the retort-house get 2d. increase per shift, and the others 3d., and labourers ½d. an hour advance and double pay for Christmas Day and Good Friday if working. Meter inspectors are to be placed on a new footing. They will be given a regular weekly wage of 31s., in lieu of being paid by the hour, and have one week's holiday with pay, and double pay if called upon to work on Christmas Day and Good Friday—no work, no pay. The advances, which have been accepted by the men at a specially convened meeting, take effect with the confirmation of the minutes of the Gas Committee by the Council. These increases apply to 220 men in the retort-houses, about 180 labourers, and some 40 inspectors.

In response to a question by the Southport Company-House Proprietors' Association, all the candidates at the municipal elections just concluded promised, if returned, to use their best efforts to secure a reduction in the price of gas to a flat-rate of 2s. 6d. per 1000 cubic feet.

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Reduction in the Price of Gas at Aldershot.

It has been decided by the Aldershot Gas, Water, and District Lighting Company to reduce the price of gas by 2d. per 1000 cubic feet to all ordinary consumers in the Company's (*a*), (*b*), and (*c*) areas—which constitute the whole of the statutory limits of supply—as well as to allow an extra cubic foot per penny to automatic consumers in the (*a*) area, dating from the reading of the meters for the Christmas quarter. The prices of gas per 1000 cubic feet will then be as follows:—

(*a*) area 2s. 4d. (2s. for cooking, heating, &c., under special conditions).
(*b*) „ 3s. 0d. (2s. 8d. „ „ „).
(*c*) „ 3s. 10d. (3s. 6d. „ „ „).

The districts in the respective areas are: (*a*) Aldershot and Tongham. (*b*) Ash, Camberley, Cove, Crookham, Ewshott, Farnborough, Fleet, Frimley, Hawley, Minley, Normandy, North Camp, Seale, and Yateley. (*c*) Bramshill, Crondall, Dogmersfield, Elvetham, Eversley, Greywell, Hartley Wintney, Heckfield, Hook, Long Sutton, Mattingley with Hazeley, Nateley Scures, Newnham, North Warnborough, Puttenham, Odiham, Rotherwick, South Warnborough, Wanborough, and Winchfield.

The "Lancet" on Fogs and Gas.

Dealing with the subject of the "undesirable legacy" which an excessively wet summer threatens to leave us in the shape of fog, the "Lancet" points out that the gas-fire is steadily replacing the coal-fire for both cooking and warming, and remarks that, as further economies are effected in the production of gaseous fuel and in the methods of burning it, we may expect a far cleaner, if at times misty, air in London during the seesaw conditions of winter weather. "Methods of gas firing have long been under a stigma owing to the defective and extravagant stoves which have been placed upon the market. . . . The neglect to study the essential conditions under which gas could be utilized for warming the house in a healthy and satisfactory way resulted in a public prejudice which has been difficult to remove. Excellent progress has now been made. Stove makers have found out that the defective article does not make for the success of their business; and the great gas companies have realized the necessity for a thoroughly scientific appreciation of the problems involved in gas firing. The result is that domestic heating by means of gas appliances is being approached on right lines, and with a success, from a hygienic and economic standpoint, which is rapidly removing the reproach which existed against such a system in former times. As this progress continues, we may hope that the movement in favour of smoke abatement will realize its aims."

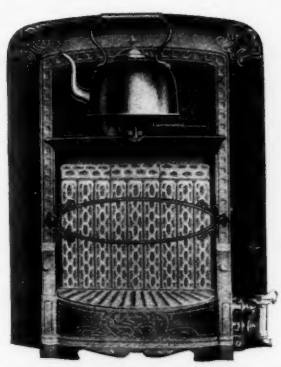
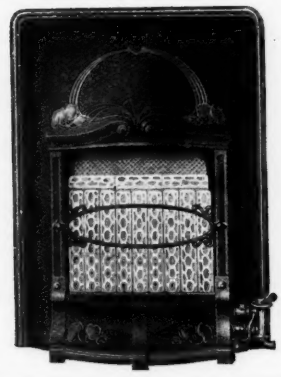
An application on the part of the bricklayers in the employ of the Manchester Gas Department for an advance in wages has been conceded by the Gas Committee, so that from date the pay will be at the rate of 10½d. per hour, compared with 10d. previously.

Finding a Gas Escape.—The simple (in more senses than one) method of finding the source of a leakage of gas by means of a light, has once more been demonstrated. On this occasion the investigator was a plumber, whose services had been requisitioned, on account of a smell of gas being perceived in one of the rooms of a house at Stalybridge. Some windows were blown out, and other damage done; and the plumber was somewhat scorched on the face and hands, as the result of his exploit, which is thus pithily recorded in a local paper: "He discovered the gas to be escaping from a gasalier suspended from the ceiling in the middle of the room, and struck a light to locate the exact spot. The explosion followed at the same moment." As to whether the explosion could "follow" at the "same moment," there may be room for doubt; but that the plumber secured just the effect that he might have expected, is abundantly clear.

Rochdale Corporation and Charges for Gas-Cookers.—Replying to questions put to him at Thursday's meeting of the Rochdale Town Council, Mr. Walker, the Chairman of the Gas and Electricity Committee, said the number of gas-cookers let out on hire at March 31 last was 3285, and the amount received from them in hire for the twelve months was about £911, practically the whole of which went in maintenance and repairs. Some towns fixed these cookers; but there were a great many places where this practice did not obtain. He agreed to submit a return as to the price of gas and the charges made in Rochdale for gas cookers and meters. Mr. Mattley expressed regret that the Gas Committee could not see their way to come into line with other towns and provide gas-cookers free of charge. In some places not only were they fixed free of cost, but the corporation provided as much as 30 feet of piping free. Rochdale had not made any move in this direction since gas-cookers were introduced; and he thought they might do a great deal towards abating the smoke nuisance if the policy of fixing these appliances free was adopted.

New Mills Council and the Supply of Gas to Disley.—The application of the New Mills District Council for sanction to borrow £10,000 for gas-works purposes was the subject of a Local Government Board inquiry in that town last week; Mr. F. O. Stanford, Assoc.M.Inst.C.E., being the Inspector for the Department. Of the total amount asked for, rather more than half is required so that the township of Disley may be supplied with gas from the New Mills Council's works; the balance being for mains, cookers, meters, &c. Mr. J. Pollitt, the Clerk to the Council, having explained in detail the items of expenditure making up the £10,000, dealt with the question of gas being supplied to Disley, and the scale of charges. He stated that up to 6 million cubic feet, excluding that part of the township already served, a differential price of 9d. above New Mills would be made; between 6 and 8 millions, an extra charge of 7d.; between 8 and 10 millions, 5d.; and beyond this quantity, 3d. The price of gas at New Mills was now from 2s. 6d. to 2s. 1½d. per 1000 cubic feet; and since the last loan, two years ago, the consumption had increased by nearly 16½ million cubic feet, or 13½ per cent. Mr. P. Lancashire, the Gas Engineer and Manager, went through the plans with the Inspector.

ON A FOUNDATION OF FACT.

"WILSON" GAS FIRES.

FIRST portable GAS FIRE in 1878.

FIRST GAS FIRE to have clear hood without pockets or obstructions in flue-way; also the full width oval flue-nozzle.

FIRST to be fitted with **Fuel** — vertical, double-length, flames burning inside and shallow fire.

FIRST with Duplex Burner, Gas and Air Adjustment, "Venturi-Tube" Burner, Regenerative Copper Reflector, &c.

The "WILSON" Fires cast no Shadow, but Overshadow all others.

WILSONS & MATHIESONS, LTD.,
CARLTON WORKS,
ARMLEY, LEEDS.

London: 76, Queen St., Cheapside, E.C.

Price of Gas in Nottingham Out-Districts.—A letter has been received by the Basford Rural District Council, from the Eastwood Urban District Council, suggesting that a joint application should be made to the Nottingham Corporation for a reduction in the price of gas supplied to the district. It was pointed out in the letter that "very large profits are made annually by the Nottingham Gas Department, the whole of which, after payment of standing charges, &c., are handed over for the relief of the Nottingham rates." The writers felt they were entitled to a proportion of the profit the Corporation made.

Gas and Water Supply in Leeds Out-Townships.—At the end of this week, the townships of Roundhay, Seacroft, Shadwell, and the populous side of Crossgates will become an integral part of the city of Leeds, according to the terms of the Extension Order recently made. Among the changes that will take place are the following: The water for which Roundhay has had to pay a 20 per cent. premium will now be supplied there at the same rate as in the city. An extension of mains, however, is necessary to render the service complete throughout the districts. With reference to gas, Crossgates, which, unlike Roundhay, is not supplied from Leeds, has in prospect the possibility of seeing the Gas Company's property taken over on terms.

The Vertical Retorts at Burnley.—At the meeting of the Burnley Town Council last week, Mr. Lees suggested that the vertical retorts which had been installed at the gas-works had not come up to expectations. He stated that the Gas Engineer had told the Gas Committee that the Corporation had been premature in installing such retorts. They were told that they would yield from 12,600 to 13,000 cubic feet of gas per ton of coal; and in a test the make was only 11,368 cubic feet, against 11,000 cubic feet produced by the inclined retorts. Mr. Lees remarked that they appeared to have an improved quality of coke, and the conditions in the retort-house were infinitely superior. On his resolution, the Council passed an amendment to the minutes asking for a full report on the working of the retorts.

Gas Profits for Museum Maintenance at Batley.—At the meeting of the Batley Town Council last Thursday, the minutes of the General Purposes Committee contained a recommendation that £100 of the surplus profits of the gas undertaking should be applied to the arrangement and maintenance of the museum at Wilton Park. Mr. J. S. Sheard, on behalf of another member, objected to the grant on the ground that while the gas profits last year were £5181 and the balance carried forward was £1762, making a total of £6943 as the estimated balance at the end of the present year, there had already been allocated £6855 for various purposes; leaving the small margin of £88. He urged that the Council were not justified in depleting to such an extent the balance of a business concern on which there were liabilities of £122,000. The Town Clerk (Mr. J. H. Craik) pointed out that the Corporation must either adopt the Museums Act, under which they could levy a halfpenny rate, take the £100 required from a remunerative undertaking, or close the museum. The amendment was negatived by 18 votes to 3.

Louth Gas Company.—The Louth Gas Company have had a prosperous year, as shown by the report presented at the annual meeting on Monday last week, under the presidency of Mr. B. Hall. Notwithstanding the difficulty in regard to coal supply, about 5 per cent. more gas was sold during the twelve months. The reserve funds have increased; and both the gross profit and the surplus are in advance of last year, though coal cost more and wages were higher. The net profits amounted to £2742; and out of the balance of £2980 standing to the credit of the profit and loss account, dividends were declared at the rate of 15¾ per cent. on the original capital, 5 per cent. on the "A" and "B" improvement stock, and 12½ per cent. on the new ordinary stock (1877). The payment of these dividends left a balance of £894, of which £500 was transferred to the contingent fund, and the rest carried forward. The services of Mr. J. A. Young, the Manager, as well as of the other officers and the staff, were acknowledged.

Redhill Public Lighting.—From time to time lively scenes, arising out of animated discussions on the alteration of public lamps from gas to electricity, have taken place in the Reigate Town Council. At the meeting of the Council on Monday last week, the Highways and Works Committee recommended that twenty lamps should be altered from gas to electricity, whereupon discussion arose. Mr. Dean thought the Council ought to defer the proposal. He did not consider it was the correct thing to be always treading on the Gas Company's toes. He had no doubt that if they kept converting gas-lamps to electricity, they would have to pay enormous rents for all existing gas-lamps. The recommendation was, however, adopted. Later in the evening, the Electric Lighting Committee stated the terms upon which they were prepared to convert the lamps; and they recommended that they should undertake to pay to the Highways and Works Committee all penalties which might accrue, under the contracts with the Gas Company owing to the conversion.

Improved Gas Lighting in Kennington Park.—At the meeting of the London County Council last Tuesday, the Parks and Open Spaces Committee reported that, under an agreement entered into in 1898 with the Vestries of Lambeth and St. Mary, Newington, the Council make arrangements for lighting the central footpath through Kennington Park, which is kept open at night, and recover the cost from the successors of the Vestries—viz., the Metropolitan Borough Councils of Lambeth and Southwark. The lighting of this footpath is not at present satisfactory, and the Committee think improvements should be effected. The South Metropolitan Gas Company have offered to refit the four existing lamps with inverted burners at a cost of about £3, to connect the supply direct to their mains, and to undertake the maintenance of each lamp (including the supply of gas) for £3 4s. 4d. a year. The Committee said this arrangement would not only effect an economy on the present system, but would also result in improved lighting; and they recommended that an agreement should be entered into with the Company to carry out the proposed change on the terms named. This was agreed to.

Gracefulness

Is expressed in every line and curve of our "ADAM" Dog Grate.

The "ADAM" is one of our Artistic and High Grade "PERIOD" Series, which during the 1911 season received such universal approval throughout the Industry as **"Gasfires which are far ahead of anything yet attempted in design and efficiency."**

It is fitted with the "RICHMOND" Patent Duplex Tap and Burner, and can be supplied in Armour Bright or Art Copper finish.

The interchangeability and standardization of essential parts—as introduced by us five years ago in our A.B.C. Gasfires—is one of the important maintenance features of the "PERIOD" Series.

THE RICHMOND GAS STOVE & METER CO., LTD.,

Gasfire Specialists, Inventors of Interchangeable Parts for Gasfires,

WARRINGTON. **LONDON.**

Rochdale Corporation Gas-Coal Contracts.—The Gas and Electricity Committee of the Rochdale Corporation have placed contracts for an additional 12,000 tons of coal; the average price being nearly 2s. per ton in excess of the amount paid last year. This represents an increase of £1000. About six or seven weeks ago, the Committee gave out contracts for 55,000 tons at an almost similar advance in price, representing an increased expenditure of £5500. This means an additional £6500 for coal, equal to the proceeds of a 4½d. rate.

Wooden Water-Pipes.—It is announced by the South Australian Official Intelligence Bureau that, in order to test the utility of wooden water-pipes, the Government have placed a contract for the supply of a considerable quantity to be employed in connection with two large water schemes at Millbrook and Mount Crawford respectively. The Company who have received the contract propose to erect extensive works at Port Adelaide in order to carry it into execution, and also to supply such pipes to the value of £40,000, for use on the Umberumberka water undertaking, which is to serve Broken Hill.

Electric Ignition of Gas.—An interesting case, says the Birmingham Gas Department Magazine, occurred at Wednesbury recently, when a gas consumer, who also had electric light in his house, thoughtlessly hung an electric lead on to the projecting knob of a gas-pendant in the kitchen. The result was that a short-circuit occurred owing to the failure of the insulation, which fused the brass down-rod of the pendant, and ignited the gas, causing a flame 18 inches long to proceed from the ¾-inch brass pipe, which had been melted, with an aperture about the size of a barley corn. Fortunately the house was not burnt down, though the ceiling was scorched.

Lighting of Schools.—In the course of his annual report, the School Medical Officer for Huntingdon makes some remarks on the lighting of schools, which, while not being new, cannot be too often reiterated. He points out that the main source of light should be from the left-hand side, and slightly from above. Subsidiary lights may be on the right. If the light comes from the back or the right-hand side, either the shadow of the body or of the hand falls upon the paper, and the scholar tends to sit sideways in order to get better light. If this habit is acquired, the child becomes "lop-sided," and may become the subject of spinal curvature. Furthermore, the vision is impaired and headache ensues. Windows should equal at least one-fifth of the floor space. They should be ample in size, and constructed of large panes of clear glass. In windows in several of the older schools, small diamond-shaped panes are to be found. There is nothing to recommend them A whitewashed ceiling acts as a reflector, and improves the lighting of the room.

Gas Profits at Leigh-on-Sea.—At the last meeting of the Leigh-on-Sea Urban District Council, the Gas Committee reported that they had considered the question of the disposal of the cumulative gas surplus to date, and recommended that a contribution of £800 be made to the district fund. Mr. N. Arnold remarked that, though the Gas Committee were pleased to contribute £800 towards the relief of the rates, it should be known that the profits for the half year just finished would only amount to about £50. This was not any too satisfactory; but there it was. Mr. H. E. Johnson, the Chairman of the Committee, said he could not accept Mr. Arnold's figures. The public should know that the past half year was the worst half. Besides, the retorts had been out of action, and they had been unable to manufacture the quantity of gas required. Hence they had had to buy between 2 and 3 million cubic feet from Southend. There had, too, been a great rise in the cost of coal; but the price of gas had not been increased. Out of the £1400 the Committee had in hand, they were giving £800 towards the relief of the rates, leaving a balance of £600. They also had a reserve of £2000; and it was estimated that they would make a profit of between £600 and £800 in the current half year. The recommendation was agreed to.

APPLICATIONS FOR LETTERS PATENT.

23,993.—Oliver, C. R., "Operating gas-lamps." Oct. 21.
24,092.—Brown, H., "Measuring air or gas." Oct. 22.
24,110.—Mills, W., "Mantles." Oct. 22.
24,113.—M'Court, C. D., and Bonecourt Surface Combustion, Ltd., "Locomobile steam-generator." Oct. 22.
24,148.—Legge, A di, "Alarm apparatus for indicating the danger of asphyxia and explosions due to the presence of lighting gas." Oct. 22.
24,165.—Thommel, G., "Lighting and extinguishing gas from a distance." Oct. 22.
24,196.—Fullen, W. W. F., "Fuel calorimeters." Oct. 23.
24,214.—Fitch, W. B., "Burners and mantles." Oct. 23.
24,223.—Farge, F. C., "Lighting and extinguishing gas." Oct. 23.
24,236.—James, J. F., "Combination gas-ring and firelighters." Oct. 23.
24,267.—Pettigrew, G., "Distillation of ammoniacal liquor." Oct. 24.
24,276.—Mieklewright, H. D., "Safety gas-fittings." Oct. 24.
24,294.—M'Court, C. D., and Bonecourt Surface Combustion, Ltd., "Furnaces." Oct. 24.
24,322.—Morgan, F. J., "Self-closing taps." Oct. 24.
24,381.—Tongue, F., and Etna Lighting and Heating Company, Ltd., "Lamps or illuminating devices." Oct. 25.
24,394.—Keith, J. & G., "Gas-lighting torch." Oct. 25.
24,399.—Kent-Johnston, A. G., Regulating the lighting and extinguishing of gas-lamps." Oct. 25.
24,442.—Colbran, J. B., "Globe-holders." Oct. 25.
24,458.—Stocks, H. B., "Incandescent burners." Oct. 26.
24,463.—Dempster, R., and Sons, Ltd, and Toogood, H. J., "Anti-dip valves." Oct. 26.
24,475.—Shakeshaft, C. E. M., and Clarkson, T. J. R., "Coin-freed gas-meters." Oct. 26.
24,525.—Hibberd, C. E., and Goad, F. L., "Coin-freed mechanism." Oct. 26.
24,544.—Bird, H., "Scoops for charging retorts." Oct. 26.

OUR NEW GAS FIRE POST CARD

May we send you a supply?

The PARKINSON STOVE CO., Ld.,
BIRMINGHAM & LONDON.

Destructive Fire at Messrs. Falk, Stadelmann, and Co.'s.—Shortly before six o'clock last Sunday morning, a serious fire broke out in a large warehouse of six floors at the corner of Cross Street, Hatton Garden, and Great Saffron Hill, E.C., occupied by Messrs. Falk, Stadelmann, and Co., Limited. In spite of the efforts of a large force of the brigade, the whole of the premises became involved; and by the time the fire was got under control, the building was completely burnt out. Among the stock of gas-fittings, &c., consumed were a very large number of gas-mantles. The brigade had one hydrant, six motor-pumps, and thirteen steamers at work.

Itchen and the Electric Light.—At a special meeting, the Itchen Urban District Council have decided, by a majority of one, to make application to the Board of Trade for a Provisional Order under the Electric Lighting Acts, authorizing the Council to supply electricity for all public and private purposes throughout the district. In opposition to the scheme, it was contended that the existing gas arrangements were satisfactory, and that the people who would benefit from the electric light were few and far between. Several members thought that the matter should be held over until the ratepayers had been consulted—seeing that, as one speaker put it, "electric light was a luxury."

New Reservoir for the Abertillery Water Board.—A commencement has lately been made of a new reservoir for the Abertillery and District Water Board. It will hold 376 million gallons, and will serve a population of 80,000 in the Abercarn, Mynyddislwyn, Abertillery, and Risca districts. Mains 16 inches diameter will be laid to Cwmtillery, a distance of 28 miles, at which point a service reservoir will be constructed. The water will then be conveyed in 12-inch mains to various places. The height of the reservoir dam will be 146 feet, with foundations of 24 feet—making a total height of 170 feet. Its length will be 974 feet, and with the tower will comprise 185,000 tons of masonry. The reservoir will be 1750 feet above sea-level, and, it is stated, will be the highest in the country. The contract has been let to Messrs. Underwood Bros. at £261,000. Mr. Baldwin Latham's firm are the Engineers.

A Saturday Night Electric Light Failure.—In some parts of Montague Street, Worthing, there was a temporary failure of the electric light last Saturday night, and several of the big shops were plunged in darkness just while there was a rush of business. The suspension of the current in St. James's Hall led to a lecture being delayed. Fortunately, however, it seems that in most cases gas-burners were available, and brought into use.

At Greenisland Railway Station, Robert Kealy, a porter, was somewhat severely injured by an explosion which occurred while he was charging an acetylene plant installed on the premises. He was conveyed by train as soon as possible to a Belfast hospital, where it was found that, in addition to shock, he had received extensive burns. The building in which the explosion occurred was almost wrecked.

At a recent meeting of the Carnarvonshire Education Committee, reference was made in the minutes of the Building Committee to the finding of water near one of the schools by a water diviner. The Secretary said that but for this the water would have had to be conveyed for a distance of half-a-mile. The same person had done similar work for the Education Committee at a place where, after repeated failures to locate water, he discovered a supply in half-a-minute.

The Welsbach Light Company, Limited, of Gray's Inn Road, W.C., send a copy of their new general catalogue, which extends to over 200 pages. The illustrations of up-to-date lighting appliances number nearly 2000, and are a proof of the big field occupied by the Company, several of whose sectional catalogues have lately been noticed. There are also before us a nice little selection of well-designed and well-executed show-cards, window-bills, &c., drawing attention to Welsbach specialities. One of the cards will be appreciated by Bridge players, as well as by the users of incandescent gas-lights. A Sunlight inverted mantle is shown shining at the top, while underneath the sun is setting in a red sky, and exclaiming: "I leave it to you, partner."

GAS COMPANIES' STOCK AND SHARE LIST.

The course of things on the Stock Exchange last week was decidedly chequered. The earlier portion of this period was an anxious time. Considerable misgivings were entertained as to the approaching settlement; and when it was found that the Continent was again keen on selling and three failures were announced, the position became gloomy. But the pressure of sales relaxing and the adjustment of the account promising better, an improvement quickly set in and lasted up to the close. The tendency at the opening on Monday was fair. Government issues were steady, and Consols rose ⅛. But, before long, Continental influences upset things very much, and prices fell. Home Rails were weaker, though not much worse; and Americans and Foreign were uneven. It was worse on Tuesday, owing to continued pressure to sell; and all markets were flat. The announcement of a failure was disquieting. Consols fell ⅛, all Rails were lower, and the rest generally were weak. On Wednesday, the tone improved materially, in spite of two more small failures. Gilt-edged lines were strong, and Consols rose ⅜. Rails were well supported at firmer prices; and the Foreign Market was steady. This cheerfulness was well maintained on Thursday; the markets experiencing much relief that the settlement was so well over. Consols rose another ⅛, Rails were really strong, and even Americans looked up. The House was closed on Friday—as usual on the 1st of November. Saturday was very quiet, many members being away till Monday; but there was a nice cheerful tone. Consols were higher, closing at 73¾ to 74—a rise of ¾ in the week. Railways were in good demand; and Foreign very firm. In the Money Market, the requirements for the Stock Exchange and the end of the month created a strong demand, and discount rates were very firm. Business in the Gas Market was, perhaps, a shade more active than it had been for the two previous weeks; and dealings were rather more plentiful, although the week was only five days long. Movements in quotations were not numerous or very important; and the biggest issues did not move at all. In Gaslight and Coke, the ordinary was fairly active and was steady; transactions ranging between 102⅛ and 103. The secured issues were very quiet. The maximum marked 81½ and 83; the preference from 100¼ to 101½; and the debenture 76¾. South Metropolitan was almost neglected; only four bargains at 116⅛ to 117¼ being recorded. There was one in the debenture at 77. In Commercials, the 4 per cent. changed hands once at 107. Among the Suburban and Provincial group, Alliance and Dublin was done at 79½, Brentford old at 260, Brighton original at 211 and 212, ditto ordinary at 153, British at 44⅛, Ilford debenture at 91¾, and South Suburban at 119½ and 120—a fall of 1. On the local Exchanges, Chester marked 109¼ (a rise of 2½), and Sheffield "C" 229 and 230. In the Continental companies, Imperial fetched from 181 to 184, ditto debenture 87, and European 19¼ and 19⅜. Among the undertakings of the remoter world, Bombay realized 6 11/16, Oriental from 130 to 134½ (a fall of 2½), Primitiva 6⅜ and 6⅞, ditto preference 5 5/16, River Plate 93¼, San Paulo preference 11⅛, and ditto debenture 49¾.

Issue.	Share.	When ex Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p.c.				£ s. d.
1,551,868	Stk.	Oct. 11	5	Alliance & Dublin Ord.	76—81	..	6 3 5
374,000	Stk.	July 12	4	Do. 4 p.c. Deb.	89—91	..	4 7 11
250,000	5	Oct. 11	7½	Bombay, Ltd.	6⅞—7⅝	..	5 9 1
50,000	10	Aug. 29	15	Bourne- mouth Gas & Water Prof. 10 p.c.	28—29	..	5 3 5
				Do. B 7 p.c.	15⅝—16½	..	4 6 2
				Do. Pref. 6 p.c.	14—14½	..	4 2 9
332,000	10	"	7	Brentford Consolidated	257—262	..	5 3 1
75,000	10	"	6	Do. New	257—262	..	5 3 1
330,000	Stk.	Aug. 14	13½	Do. 5 p.c. Pref.	116—118	..	4 4 9
330,000	"	"	10½	Do. 4 p.c. Deb.	96—98	..	4 1 8
50,300	"	"	5	Brighton & Hove Orig.	210—215	..	5 2 4
206,250	"	June 14	4	Do. A Ord. Stk.	152—155	..	5 3 3
218,230	Stk.	Aug. 29	11	British	44—45	..	5 11 1
244,300	"	"	8	Do. 4 p.c. Deb. Stk.	91—93	..	4 6 0
530,000	20	Sept. 27	12½	Buenos Ayres 4 p.c. Deb.	93—95	..	4 4 3
120,000	Stk.	June 28	4	Cape Town & Dis., Ltd.	2—3	..	—
245,771	Stk.	June 28	4	Do. 4½ p.c. Pref.	3½—4½	..	—
100,000	10	—	—	Do. 4½ p.c. Deb. Stk.	70—73	..	6 3 3
100,000	10	—	—	Chester 5 p.c. Ord.	110—112	+2½	4 9 3
100,000	Stk.	June 28	4½	Commercial 4 p.c. Stk.	106—108	..	5 1 2
157,150	Stk.	Aug. 29	5	Do. 3½ p.c. do.	101—103	..	5 3 6
1,513,380	Stk.	Aug. 29	5/9/4	Do. 3 p.c. Deb. Stk.	73—75	..	4 0 0
560,000	"	"	5½	Continental Union, Ltd.	80—83	..	4 16 5
475,000	"	June 14	3	Do. 7 p.c. Pref.	133—135	..	5 3 8
800,000	Stk.	May 31	4	Derby Con. Stk.	124—125	..	4 12 0
200,000	"	"	7	Do. Deb. Stk.	103—105	..	3 16 2
492,270	Stk.	—	5½	European, Ltd.	19—20	..	5 0 0
55,000	"	—	4	Gaslight and Coke 4 p.c. Ord.	101½—103½	..	4 14 1
1,002,180	10	July 26	10		81—84	..	4 3 4
16,160,600	Stk.	Aug. 14	4/17/4	3½ p.c. max. and 4 p.c. Con. Pref.	99½—101½	..	3 18 10
2,600,000	"	"	3½	Coke 3 p.c. Con. Deb.	76—78	..	3 16 11
4,062,235	"	"	4	Hastings & St. L. 3½ p.c.	91—93	..	5 7 6
4,531,705	"	June 14	3	Do. do. 5 p.c.	—	..	—
258,740	Stk.	Sept. 13	5	Hongkong & China, Ltd.	16—16½	..	6 13 4
82,500	"	"	6½	Ilford A and C	154—157	..	4 17 1
70,000	10	Oct. 11	11	Do. B	121—123	..	4 19 7
131,000	Stk.	Sept. 13	7⅞	Do. 4 p.c. Deb.	91—93	..	4 6 0
65,780	"	"	6½	Imperial Continental	180—185	..	4 17 3
65,500	"	June 28	4	Do. 3½ p.c. Deb. Red.	86—88	..	3 19 7
4,940,000	Stk.	May 15	9	Lea Bridge Ord. 5 p.c.	122—125	..	4 16 0
1,235,000	Stk.	Aug. 14	3½				
200,242	Stk.	Aug. 29	6				

Issue.	Share.	When ex Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p.c.				£ s. d.
561,000	Stk.	Aug. 29	10	Liverpool United A.	216—218	..	4 11 9
718,100	"	"	7	Do. B.	155½—157½	..	4 8 11
306,083	"	June 28	4	Do. Deb. Stk.	100—102	..	3 18 5
63,480	Stk.	June 28	3	Maidstone 3 p.c. Deb.	69—71	..	4 4 6
75,000	5	June 14	6	Malta & Mediterranean Met. of Melbourne 4½ p.c. Deb.	4⅛—4⅜	..	6 3 1
250,000	100	Oct. 1	4½		99—101	..	4 9 1
541,920	20	Oct. 30	3½	Monte Video, Ltd.	11½—11¾*	+¼	5 19 2
1,775,892	Stk.	July 26	4½	Newc'tle&G'tesh'd Con.	99—100	+½	4 7 6
529,705	Stk.	June 28	3½	Do. 3½ p.c. Deb.	85—86	..	4 1 5
55,940	10	Aug. 29	7/7/0	North Middlesex 7 p.c.	13½—14½	..	5 1 5
300,000	Stk.	May 15	8	Oriental, Ltd.	130—133	−2½	6 0 4
60,000	5	Sept. 27	10	Ottoman, Ltd.	8¼—8⅝	..	5 14 3
60,000	50	Aug. 14	13	Portsea Island B	127—130	..	5 0 0
100,000	50	"	12	Do. C	124—127	..	4 14 6
249,980	5	Oct. 11	8	Primitiva Ord.	6⅞—7	..	5 14 4
499,960	5	June 28	5	Do. 5 p.c. Pref.	5—5⅛	..	4 15 3
521,600	100	June 1	4	Do. 4 p.c. Deb.	96—98	..	4 1 8
346,198	Stk.	June 28	4	River Plate 4 p.c. Deb.	93—95	..	4 4 3
275,000	5	Apl. 12	12	San Paulo, Ltd.	13—14	..	4 5 9
150,000	10	Sept. 27	6	Do. 6 p.c. Pref.	11⅛—12	..	5 0 0
125,000	50	July 1	5	Do. 5 p.c. Deb.	49—51	..	4 18 0
135,000	Stk.	Aug. 29	10	Sheffield A	230—232	..	4 6 2
209,984	"	"	10	Do. B	229—231	..	4 6 7
523,500	"	"	10	Do. C	229—231	..	4 6 7
90,000	10	Sept. 27	7½	South African	9—10	..	7 10 0
6,429,895	Stk.	Aug. 29	5/9/4	South Met., 4 p.c. Ord.	116—118	..	4 12 8
1,895,445	"	July 12	3	Do. 3 p.c. Deb.	76—79	..	3 15 11
209,820	Stk.	Aug. 14	8½	South Shields Con. Stk.	163—165	+1	5 3 0
605,000	Stk.	Aug. 14	5/16/8	S'th Suburb'n Ord. 5 p.c.	118—120	−1	4 17 1
60,000	"	"	5	Do. 5 p.c. Pref.	117—119	..	4 4 0
117,058	"	July 12	5	Do. 5 p.c. Deb. Stk.	120—122	..	4 2 0
594,740	Stk.	May 15	5	Southampton Ord.	105—107	..	4 13 6
120,000	Stk.	Aug. 14	7½	Tottenham A 5 p.c. and B 3½ p.c.	142—145	..	5 0 0
483,940	"	"	5¾		114—116	..	4 19 2
149,470	"	June 28	4	Edmonton 4 p.c. Deb.	94—96	..	4 3 4
182,380	10	June 15	5	Tuscan, Ltd.	8⅜—8⅝	..	5 15 11
149,900	10	July 1	5	Do. 5 p.c. Deb. Red.	97—99	..	5 1 0
236,476	Stk.	Aug. 14	5	Tynemouth, 5 p.c. max.	115—115½	..	4 6 7
255,636	Stk.	Aug. 29	6⅞	Wands- B 3½ p.c. worth 3 p.c. Deb. Stk.	133—141	..	4 17 6
85,766	"	June 28	3		70—72	..	4 3 4

Prices Marked * are "Ex. Div."

We have received from Messrs. James Milne and Son, Limited, a booklet they have had prepared for the use of gas companies' inspectors and show-room attendants. It furnishes particulars, with prices and illustrations, of their "Viaduct" and improved "Milton" burners, and "Graetzin" lamps.

At a recent meeting, the Abingdon Rural District Council adopted a report from their Committee recommending that a public water supply for Sutton Courtney be established. The question of purchasing a plot of land forming the watershed for supplying water to Sunningwell was referred to the Water Committee.

The Universal Light and Sign Company, of Gray's Inn Road, W.C., have issued a fully illustrated catalogue of their "F.O.S." gas-flash signs, a description of which was given in the "JOURNAL" for Jan. 9 last, p. 85. The catalogue shows the many forms in which the signs can be had, and the numberless positions in which they can be profitably employed.

It is announced by Mr. Theodore Gregory, the Liquidator of the old firm of Meldrum Bros., Limited, that the whole of the assets—including the engineering works, iron foundry, machinery, tools, patterns, drawings, patents, and goodwill, also the stock-in-trade, work in progress, and book debts of the concern—have now been purchased by a new Company, who will carry on business at Timperley (as before) as Meldrum Bros., Limited. Mr. John Meldrum, who has been associated with the business for the past sixteen years, and has been managing the business under the Liquidator, will be Managing-Director of the new Company, assisted by a technical and commercial staff.

Under the title of "Intenso Inverted Burners, Limited," a Company has been registered with a capital of £500, in £1 shares.

The Parkinson Stove Company, of Birmingham, have been successful in obtaining the order for supplying a number of large gas-cooking appliances for the kitchens of the South Manchurian Railway Company's new hotel at Dalny.

Messrs. Tangyes, Limited, of Birmingham, are supplying some extensive pumping plant for the Ravensthorpe pumping-station of the Northampton Corporation. It includes a triple-expansion condensing steam-engine of the Corliss type, having cylinders 11½, 18, and 28½ inches diameter, with a stroke of 20 inches. The speed is 100 revolutions per minute. The crank-shaft has extensions on each side carrying a friction clutch and pinion so arranged that the well and surface pumps may be worked separately or together as required. The former consist of a set of Tangye triple-barrel pumps, with barrels 10⅝ inches diameter and 21-inch stroke, running at a speed of 23 revolutions per minute, and they are required to raise 576,000 gallons of water in 24 hours from a well 87 feet deep, and discharge it into a pure-water tank placed at a height of 319 feet above Ordnance datum. The surface pump is of the Tangye horizontal ram type, having rams 13 inches diameter with a stroke of 15 inches. This pump is capable of delivering 1½ million gallons of water in 24 hours against a static head of 120 feet when pumping into the high-level reservoir, in addition to friction through 9½ miles of 16-inch main, and with one of the existing pumps discharging into the main at the same time—thus making the total head 350 feet.

WANTED, FOR SALE, CONTRACTS, &c., ADVERTISEMENTS IN THIS WEEK'S "JOURNAL."

Appointments, &c., Vacant.

GAS AND WATER MANAGER. Tyldesley-with-Shakerley Urban District Council. Applications by Nov. 12.
DRAUGHTSMAN. No. 5646.
FOREMAN SUPERVISOR AND HEAD GAS-FITTER. Calcutta Corporation. Applications by Dec. 15.
CHIEF CLERK. No. 5648.
WORKING FOREMAN. Brymbo Water Company.
MAIN AND SERVICE LAYER. No. 5643.
GAS FITTERS. No. 5647.
STOKER. Brownhills Gas Company.

Appointments, &c., Wanted.

POSITION OF TRUST BY A SECRETARY. No. 5649.

Plant, &c. (Second-Hand), for Sale.

CAST IRON PIPES. Wills and Packham, Sittingbourne.
LAMP COLUMNS AND LANTERNS. Barnsley Gas Company.

Stocks and Shares.

BOGNOR GASLIGHT AND COKE COMPANY. By Auction. London Mart. Nov. 12.

Stocks and Shares *(continued.)*

GRAVESEND AND MILTON GAS COMPANY. By Auction. London Mart. Nov. 12.
HERNE BAY WATER COMPANY. By Auction. London Mart. Nov. 12.
HYTHE AND SANDGATE GAS COMPANY. By Auction. London Mart. Nov. 26.
KINGSTON-ON-THAMES GAS COMPANY. By Tender. Nov. 27.
LOWESTOFT WATER AND GAS COMPANY. By Auction. London Mart. Nov. 26.
PINNER GAS COMPANY. By Auction. London Mart, Nov. 26.

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[*See Article in* "Journal" *for Oct.* 1, *p.* 20.]

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